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Export Taxes and Their Effects on Farmers' Profitability and Risk in Argentina

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“EXPORT TAXES AND THEIR EFFECTS ON FARMERS’ PROFITABILITY AND RISK IN ARGENTINA”

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This main objective of this thesis is to analyze the effects of export taxes on the risk faced by farmers in different regions of Argentina in their cropping operations for wheat, sunflower, soybeans and corn. In the first chapter we introduce the variables and explain the agricultural environment in Argentina. A set of three profit function models with different export tax policies were specified in a Monte Carlo simulation template using data from 1985 to the present. A set of risk measures for the upper and lower partial moments along with the overall probability distribution statistics are used to asses profit risk on each simulation output for the three models. It was found that the model with variable-rate export tax modestly reduces the downside risk while increasing the upside dispersion offering larger profit opportunities. For the fixed-rate export tax model the probability of low partial moment about zero has more mass, especially in the marginal regions. The model without export tax shows overall positive means and more mass on the upside of the distribution as expected. Comparison of results with normal distributions for the input variables with those from distributions that fit the data the best showed that there is not a clear pattern, however the differences could be significant given that the probability mass could shift to the other side of the benchmark established at zero profits and therefore could affect farmers' management strategies.

Dedication

In dedication to my lovely wife Angeles and my newly born son Facundo María who encouraged and believed in me. They made this voyage possible and endured with me during this beautiful experience at Lincoln, Nebraska. They deserve all the credit and all my love.

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Chapter 1 - Introduction

1.1. Statement of the problem

In this paper we will analyze the effects of different Export taxation models on the profitability and risk faced by different in different regions of Argentina. For that it is necessary to introduce a few concepts first.

Export taxation is an instrument for raising government revenues with a long history in Argentina. Usually ad valorem taxes are applied to the international price of goods which are intended to be sold in international markets although fixed, per-unit taxes have also been used. The reason governments impose them is to raise government revenue, subsidize processing industries by lowering raw material prices, protect the environment, insure food security and promote food price stability (Piermartini, 2004). A common economic policy strategy is to use export taxes as a way to benefit from better terms of trade. For large countries, export taxes lower domestic prices while increasing world prices leading to improved terms of trade. Taxing raw product exports more heavily than by-products and processed goods could foster the development of local industries. However, in Argentina the effects of the export tax on agricultural output may be negative lowering sectoral productivity.

Piermartini (2004) noted that the World Trade Organization, WTO recorded export taxes in 39 countries on a variety of commodities between1995 and 2002.

Argentina is a leading country in this matter (Sapelli, 1995). The Argentine economy relies especially on the primary sector and the food processing industries(Lazzati & Pacheco, 2003). Throughout Argentine history, this taxing measure was applied many times for specific reasons like raising government revenues to counter the government deficit or to make transfer from the agricultural to the industrial sector (Argañaraz et al., 2010; Chauvin and Ramos, 2013; Mundlaket al., 1989) Nowadays export taxes are one of the main sources of government revenues.

In the political arena, many argue that export taxes promote equality among economic sectors in Argentina (Cicowiez, Díaz-Bonilla, & Díaz-Bonilla, 2010) (Hanickel & Román, 2008). The ways these taxes are currently applied do not seem to be fair across different types of productive units (farm level) in Argentina. To analyze the fairness of this taxation we need to understand the political reasons for their use. The main purpose of introducing the export taxes was to generate government revenues to make transfers to other sectors of the economy. As explained by the ruling party, the "excessive" or "extraordinary rent," As measured by the difference between international prices and the unit costs of production that the primary sector was appropriating was the result of a new macroeconomic situation with low currency exchange rates and increases in world commodity prices (Denegri, Rosa, & Gonzalez, n.d.). Rent has two different meanings for economists. First, rent is the income from hiring out land or other durable goods. The second, also known as economic rent, is a measure of market power: the difference between what a factor of production is paid and how much it would need to be paid to remain in its current use.
In perfect competition there are no economic rents, as new firms enter a market and compete until prices fall and all rent is eliminated. Reducing rent does not change production decisions, so economic rent can be taxed without any adverse impact on the real economy, assuming that it really is rent.

These circumstances triggered the implementation of the export taxes without differentiating among the types of farmers and their cost functions (Anino, Pablo Y Mercatante, 2008). Costs of production are related to the geographical position (distance to ports) or the productive potential of the land (soil quality and rain distribution patterns). The ad valorem export taxes simply offset a percentage of the international Free On board (FOB) price at the main ports in Argentina, Buenos Aires, San Martin, Necochea, and Bahia Blanca and the up-river Parana ports (Figure 1-1).

Figure 1-1. Argentina Ports and Parana Up River. Source:
http://www.shiparrested.com/category/countries/argentina., and
http://www.sspyvn.gov.ar/hidrometros.html

This leaves many farmers with prices which do not generate rent, or even profits and do not cover the production cost. One can argue that if that is the case, Argentine production should have decreased over the years. In fact the acreage, yield and total production of some crops steadily increased (soybeans) while for other crops, such as wheat and sunflower, acreage decreased.

Profits are the difference between the market price and the costs of production. In a perfectly competitive market, profits are driven to zero so the costs of production will be equal to the price. In particular, the costs should include a return to the factors of production used in producing the good. This return is often thought of as profit and is distinguished from "economic profits" which are zero in perfect competition. For farmers, the costs of production include payments to all the inputs plus returns to owned land and family labor. The returns to owned land (rented land shows up as a direct cost requiring a monetary outlay but for land that is owned by the producer, the land cost is an opportunity cost) and family labor have to be high enough to retain the land/labor in the productive activity at least on average over time (there can be short-term losses).

The concept of rent used by the government refers to "economic profits." Because agriculture is usually close to being a perfectly competitive industry (farmers are price takers), the expectation is that there may be normal returns to land and labor but no rents or economic profits. Rents or economic profits arise because of market imperfections. It is difficult to determine the exact amount of economic profits because firms can price some of their inputs however they may want making their costs of production look greater than they would be with a more appropriate accounting. But the general idea is that if there are economic profits or rents, it has to be the case that there is some sort of market failure. Then the export tax is thought of as a measure to tax away the rents which are undeserved (they are more than is needed to retain the factors in their current activities). If Argentine agriculture is competitive, there should be no economic profits/rents. One thing that may have happened is that the price increases that began in 2007 may have led to some excess profit. But because that price increase is unlikely to be sustained over time, a policy to tax the excess would have to be retired once the price increases cease.

The primary sector depends on three factors of production: capital, labor and land. Farmers cannot deviate from the agronomical rotation of crops for long without decreasing soil quality, yield potential and therefore subsequently affecting the potential returns to the land (Viglizzo, Pordomingo, Buschiazzo, & Castro, 2005). That could be one reason why farmers produce crops that might not be profitable in a particular year. Another consideration is that the price reduction caused by the ad valorem export taxes decreases the potential return ("potential" because farming is a risky production, i.e. pest and rainfall conditions can influence the quantity of production and hence the rent). Moreover, some regions that are being taxed can only realize profits through the use of high technology and management, which increases the investment and risk, which are also important to be addressed.

An argument is made in Argentina that since farmers are earning economic rent, it is correct to tax that away to improve conditions in other parts of the economy. But rents are possible only if there is some sort of distortion or market failure and if that is the case it makes more sense to correct the inefficiency rather than to allow farmers to profit from the distortion and then tax their gains away. If the export taxes are high enough to cause losses for some types of farmers, then the main purpose of introducing this taxation falls apart due to the fact that there is no "extraordinary rent" to be redistributed to other sectors of the economy. From this point of view the rent is not static but dynamic. Furthermore, many marginal areas that became profitable thanks to the increase in the international prices of commodities, after the payment of export taxes are no longer profitable. To continue in production these areas would need some other subsidies or government support in order to promote development of the region. In fact, after the so called "farm rebellion", which was a long lasting general sectorial union strike, the agricultural sector and the government reached an agreement in which the distance to the port and a policy to segregate farmers through their total amount of production was going to be considered when selling the production. More specifically, farmers who are further than 400 kilometers from the ports will receive a compensation that brings the freight cost to an equal tariff for everyone, and those who produce between 100 and 700 Tons a year receive a different compensation by the approved Bill 126/15 (Ministry of Economics and Finance, Argentine Government).

This study aims at exploring how different export tax models affect the expected profits and risks faced by producers of different crops in different regions in Argentina. The issue is important because measuring the impact of these taxes on the firm's profits in the long run in the entire sector and especially in the most vulnerable and poor areas of the marginal regions of the country could help understand how agriculture reacts to different policies.

One of the main problems is that export taxes were applied to the international output price, and this price is the reference price that all the productive units receive, regardless of their cost functions, acreage, technology used as inputs, soil yield potential and regional location. This means that this tax could in fact be withdrawing not only the rent but also the firm's profits, leaving the productive units without incentives to keep producing. Knowing in which regions the effect is more restrictive, could lead to a better understanding of how to apply the taxes. Moreover, looking at the critical price level that separates positive profits from losses in each region and each crop helps understand the effect of this tax on the productive units. Given that the risk faced by farmers is different depending on soil, weather, location, technology, capital availability and management it would be wise to try to analyze the connection between the export taxes and risk sources. The risk faced by farmers varies depending on many variables. Furthermore, it is plausible that these variables change not only through time but also geographically and across crops.

Understanding the risk situation faced by different types of farmers in different regions could help solving the unfairness problem of applying the same export tax to structurally different productive firms. For those policy makers, the ability to know the burden of this tax will help them to apply the policy focusing on fairness and efficiency in revenue collection. Furthermore, a more differentiated tax policy could lead to the sustainability of the agriculture resources by allowing the cropping of less profitable grains which increases soil quality and gives equilibrium to the agronomic environment, instead of delivering a higher rent.

1.2. Objectives

The objective of this thesis is to address the question of how export taxes influence production systems within the agriculture sector of Argentina from an economic point of view. In other words, how do export taxes affect the probability distribution of profits, particularly with respect to expected values and dispersion (risk)? For that we first need to understand the main variables of the profit functions and their differences across regions and crops. North Buenos Aires (N BSAS), South Entre Rios (S Entre Rios), South Santa Fe (S Santa Fe), South Southeast Cordoba (S SE Cordoba), Southwest Buenos Aires (SW BSAS), Southeast Buenos Aires (SE BSAS) and West Buenos Aires (W BSAS) are the main regions for Corn production. North Buenos Aires, South Entre Rios, South Santa Fe, South Southeast Cordoba, Southwest Buenos Aires, Southeast Buenos Aires, West Buenos Aires, Salta and Santiago del Estero are the principal regions for Soybeans production. East La Pampa (E La Pampa), South Southeast Cordoba, Southwest Buenos Aires, Southeast Buenos Aires and West Buenos Aires are for Sunflower production. And finally East La Pampa, North Buenos Aires, South Santa Fe, South Southeast Cordoba, Southwest Buenos Aires, Southeast Buenos Aires and West Buenos Aires are the primary regions for Wheat production. These are the regions that are investigated in this research, representing the main production areas and major crops in Argentina.

The hypothesis is that export taxes are not only taking away the rent but also the profits of the productive units. Three models are explored in this research. The base model considers no export taxes. Then, a model with the current export tax system is introduced. That system establishes a fixed rate charged to producers regardless the price level in the international market (fixed-rate model). Finally, a model with export taxes based on a mobile scale is also examined (variable-rate model). This mobile scale adjusts the tax rate according to the price level in the market, i.e. higher (lower) rates are charged when market prices go up (down). As will be discussed later, this mobile scale was proposed by the government a few years ago, but rejected by Congress and hence not implemented.

Results from the no-tax model and the fixed-rate model can be used to evaluate how much the current export tax system affects farmers' profitability and risk compared to a situation without export tax. Then, results from the fixed-rate model and the variable-rate model can be used to assess whether farmers would have been better off in terms of profitability and risk if the export tax with a mobile scale had been approved by Congress.

Last, a further exercise will also be conducted. The empirical analysis will be based on Monte Carlo simulations, as will be discussed in more detail later. It is common to assume that variables are normally distributed in these simulations, instead of testing for and then using the actual distributions. Two sets of simulations will be performed here: one assuming normality and another using the actual distributions of the variables. Results from these two sets will be compared, which will allow for a discussion of the trade-off between the simplifying assumption of normality and the accuracy of the results.

1.3. Scope and Significance of expected outcomes

It is important to study the effects that the ad valorem export tax has in the agricultural sector of Argentina. Constantino and Puyana suggest that the country may be suffering from "Dutch disease"[1]. Dutch disease occurs when demand for one of a country's exports drives up the value of its currency making other exports uncompetitive on global markets. It has been observed particularly in countries in which petroleum has been discovered. In these cases, export taxes would lower the rents of the commodity driving up the currency values while at the same time helping to mitigate the exchange rate changes. The government would tax extraordinary rent and possibly profits of the primary sector to support its expenses on social programs and subsidies for the industrial sector, to create sustainable economic growth in the future. Due to this policy, imbalances in the net cash flow of the national accounts should be expected. For example, during the first years of the new millennium the inflow of capital generated by Argentine agricultural exports of primary commodities led to an increase in the exchange rate, potentially harming the industrial sector which depends heavily on exports. In fact that did not finally happen thanks to the Brazilian economy that increased its industrialized imports from Argentina under the Mercosur free tradable zone. So it seems important to analyze the consequences of the policies that use the revenues collected by the export taxes on primary goods to reallocate those resources in other sectors. Even though the reallocation of these resources is out of the scope of this paper, we understand that for those who would decide the allocation of resources, this paper could shed light on the matter.

After 2008, world commodity prices decreased and rose again in 2011(see FAO commodity price index), but later on prices decreased again and the revenues from the export

1 A better explanation of possible Dutch disease in Argentina is in "The Takeover of Soy and Dutch Disease in Argentina: An Agricultural Curse?" (Constantino & Puyana, 2013).

taxes suffered and at the present the government is facing financial problems to continue supporting its social programs. The future dilemma for the next government coalition will be to disentangle the crossed taxes, quotas, and other policies without affecting the government revenues and social programs (Deese & Reeder, 2007; Garriga & Rosales, 2008; J. J. Nogués, 2008). If the export taxes are needed for government revenues, at least the next coalition in power should know which the most vulnerable regions are and which farmers are most exposed to going out of business. Policy-makers could take account of the effects that export taxes are having on the profits and risk faced by farmers in all the regions, especially in the marginal areas, in order to promote a better allocation of resources. Furthermore, taking into account the risk profile of the different regions, crops and farmers when applying export taxes would lead to a fairer collective and redistributive tax system.

1.4. Overview of data and research method

First of all, it is necessary to measure the profits, revenues and costs for the different crops and regions. Time series data on direct production costs (fertilizer, seed, agrochemicals, tillage); direct marketing costs (short and long freights, drying, grain handling, storage, and related stamps and taxes), harvest free alongside ship prices (FAS), expected yields, and finally gross and net margins are available from the magazine Margenes Agropecuarios. Given that the overhead costs (fixed costs) depend on the particular infrastructure and firm organization, it is more difficult to obtain estimates of this cost for the different regions; nevertheless estimates of these costs are calculated by the Ministry of Agriculture, Cattle and Fisheries (MAGYP, as in its acronym in Spanish).

Furthermore, with available time series data of total crop production, acreage and yield for each region and each crop from 1985 to 2014 it is possible to analyze the different distributions of these variables in each region. This analysis includes those that, from the soil fertility perspective, are termed “marginal,” (meaning with less productive potential for any reason) in order to include in the models the variability of yields, direct cost, indirect cost and marketing cost of the firms. Moreover, constructing a profit distribution function across different regions and different crops will help make inferences about the variables that affect farmers’ profits, which could be from the agronomical environment, others from the political context and others from the economic situation.

The hypothesis is that profits and risk faced by the farmers are not of equal level across regions and crops. Using Monte Carlo simulation methods to generate profit distribution functions it is possible to analyze the risk involved in the different productive units for each region and crop. Using historical data and Vertex 42 Excel template Software, random variables like yield, costs and prices are generated and used to estimate a probability distribution function for profits across regions and crops. Analysis of the moments of the probability distributions allows for a comprehensive discussion of expected profits and risks involved under each model for the export tax.

Chapter 2 -Theoretical background

Accounting profits are total revenues minus total costs including taxes paid. Output price variability has more weight in determining profits than any of the particular input costs, given that production costs are spread across many different inputs and their prices can vary independently (or their variability could even compensate each other). It seems more probable to have a change in the price of the output than an increase in all the inputs at once. At the same time it seems more reasonable to expect more variations in the output prices than in the input prices (this is not a rule and could happened to be the opposite) , given that the world commodity prices are affected by many variables. (ORA, Agricultural Risk Office, MAGYP). It makes sense to analyze the sensitivity of profit functions with respect to price variations and taxes.

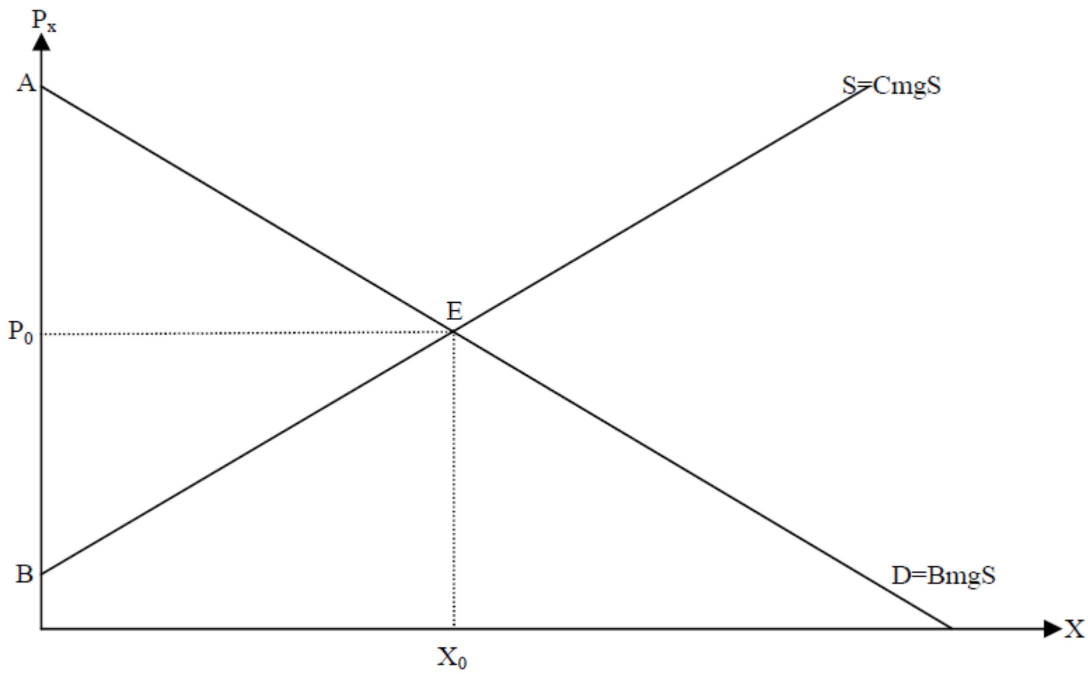


Figure 2-1. Market Equilibrium in a close economy. Source: Garriga and Rosales, 2008.

Garriga (2008) explains the model of export taxes in a market economy. Starting with a closed economy we can represent demand and supply with the well know curves, and the equilibrium market price (P_0) is achieve where those curves intersect each other (E), in a domestic price and output production space (Figure 2-1). If we open the economy to export markets, firms would face world market prices (P*) [12] and if exporters cannot affect the world prices then the demand curve becomes A C S* (Figure 2-2). So after point C in this two dimensional space, the exporters face always P*. Finally, the new equilibrium in the domestic market moves from E to C where X^d_1 is consumed at P* and the difference between X^S_1 (total production) and X^d_1 is exported at P*.

Domestic consumers face a higher price P* and decrease their consumption of the good from X_0 to X^d_1. The P_0 P* C E area is the consumers surplus loss. On the other hand, the producers surplus increases by the area P_0 P* D E. The area X^d_1 C D X^S_1 represents the value of the exports and revenues from international trading that enters the economy.

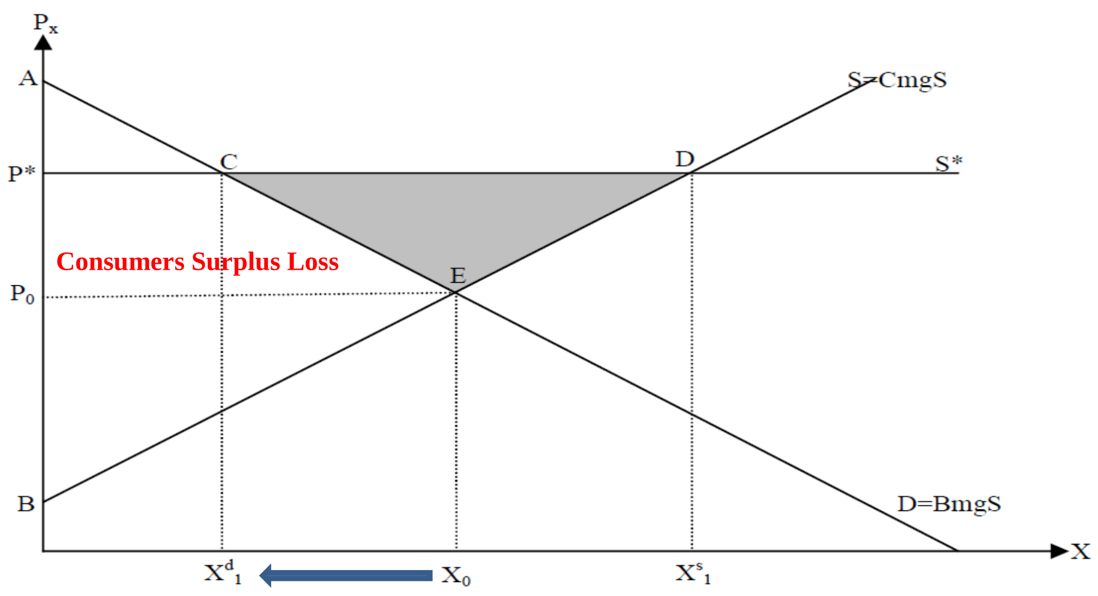


Figure 2-2. Market equilibrium in an open economy. Source: Garriga and Rosales, 2008.

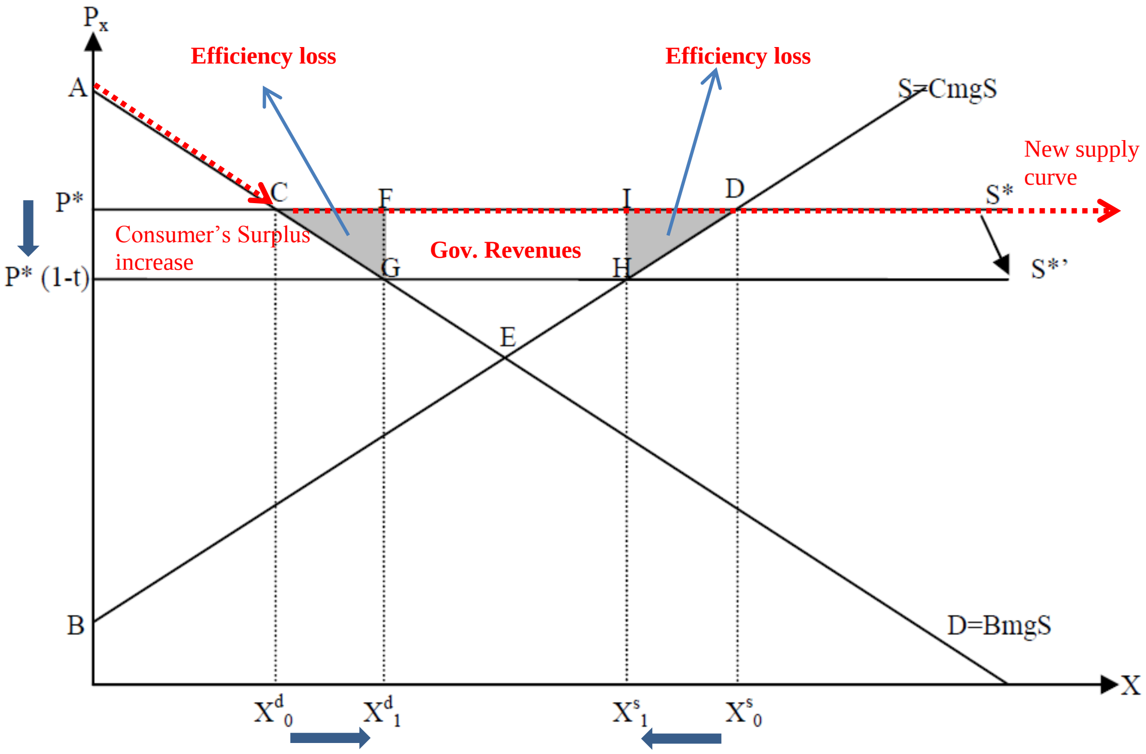


Figure 2-3. Export taxes in an open market. Source: Garriga and Rosales, 2008

Concerning the export taxes, along with the transfer of revenues from one sector to another, there is a loss of efficiency in the market (Figure 2-3). If export taxes represented by "**t**" were applied then the price faced by the producer moves from P* to P*(1-t), and the demand curve changes from A C S* to A G S*´. A new domestic equilibrium at G exists and domestic demand moves from X^d_0 to X^d_1 while on the production side the supply decreases from X^S_0 to X^S_1 generating a contraction on the export amounts. The effect of the exports taxes can be seen in the increment of domestic consumption due to the lower price and in the change in the area of consumer's surplus P* C G P*(1-t). The area X^d_0 C G X^d_1 represents the value of the increase in domestic consumption. The effects on producers are a transfer to other sectors of the economy valued by X^S_0 H D X^S_1.

Piermartini, R. (2004) explains that if a large exporting country has market power, variations in their export quantities will affect world price. Dees and Reeder (2007) suggest that Argentina is a large country. The terms of trade for a large exporting country are increased by the higher world price. Export taxes l generates an efficiency loss for both the exporting and importing countries (the efficiency loss in the exporting country is the shaded area in Figure 2-3). This efficiency loss is due to the tax effect on the amount to be traded that differs from the competitive level causing a deadweight loss. At the lower price, producers will supply less to the market. On the other hand, the artificially low price gives incentives to consumers to increase consumption. Meanwhile, in the importing countries the increase in price will lead to substitution of the commodity or to try to increase internal production more than it will occur in free trade, and the consumer's consumption is reduced. As a consequence in the importing country a welfare loss will occur because of efficiency effects and the terms of trade effect. In the exporting country, part of the loss in consumer surplus is transferred to the government which collects the tax. The net welfare effects of the tax will be positive if government revenue is greater than the two deadweight loss triangles.

In contrast, in a small country that is a price-taker and that establishes export taxes, the effect is that the internal price will decrease and be lower than world price that remains unaffected. As a result, the country will bear all losses and will not be able to transfer part of the cost of the tax to the rest of the world importers. The redistribution effect on income will still happen in the exporting country but there will be no redistribution effect in the foreign importer countries.

In relation to our paper, since the Argentine farmers face world prices (measured as the FOB price) and the ad valorem export tax applied by the government lowers that world price creating a lower domestic price (the FAS price),. Argentine farmers (aggregated level) were producing X^S_0 in the open economy and then after the introduction of the taxes moved to $X^S_{1.}$ Given the fact that there are many other variables affecting the equilibrium model, it was not an immediate movement, but after 13 years the production of wheat and sunflower crops diminished substantially. In contrast, the domestic processed agricultural goods prices decreased, as it was expected by the government, signifying a transfer of resources to the Argentine households, especially by the effect of taxes on wheat and corn production. As an example, the cost of bread (main input is wheat), pork, beef and poultry (an important input is corn) have decreased at retail level. However, this effect only lasted for a short period given the high inflation rate in Argentina. The discussion of the impacts needs to be supported with references or statistical data arrayed in a table.

The reallocation of resources generated by the export taxes could potentially generate a Pareto improvement for society. The imposition of an export tax will favor production of by-products goods while it will negatively affect complementary goods. As an example, the taxes applied to Argentine soybean exports results in favoring the processor sector (soybean oil and soybean meal producers) competitiveness. And for the income effects across production factors, when the elasticity of supply is low and the elasticity of demand is high, the export tax will affect the return from the production factors (Garriga & Rosales, 2008). If these factors cannot be reallocated, a decline in their use will be observed. Those factors that can be reallocated will not lose in the same amount. In Argentina, one can hypothesize that the imposition of the taxes on wheat and sunflower could have been one of the main drivers of the reduction in their acreage through the loss of profitability for farmers, but we cannot conclude this from the empirical information in Figure 2-4, given the fact that many other variables like prices or technological change could have also an effect. In many cases the land was shifted to soybeans which in fact had an important increase in acreage (Figure 2-4). Soybeans were and still are more profitable than the other crops, even with the current fixed level of export taxation, therefore it expanded constantly since the introduction of export taxes in Argentina, sometimes replacing wheat, sunflower and corn. However, without a full model of land use in Argentina we can't conclude that the export tax caused the shifts in acreage. For the case of corn, even though the loss of profits due to export taxes the acreage loss to soybeans was not as high compared with wheat and sunflower. As in example the acreage of the four main crops in Buenos Aires State had suffered important changes since the reintroduction of export taxes in 2002 shaded area in Figure 2-4)

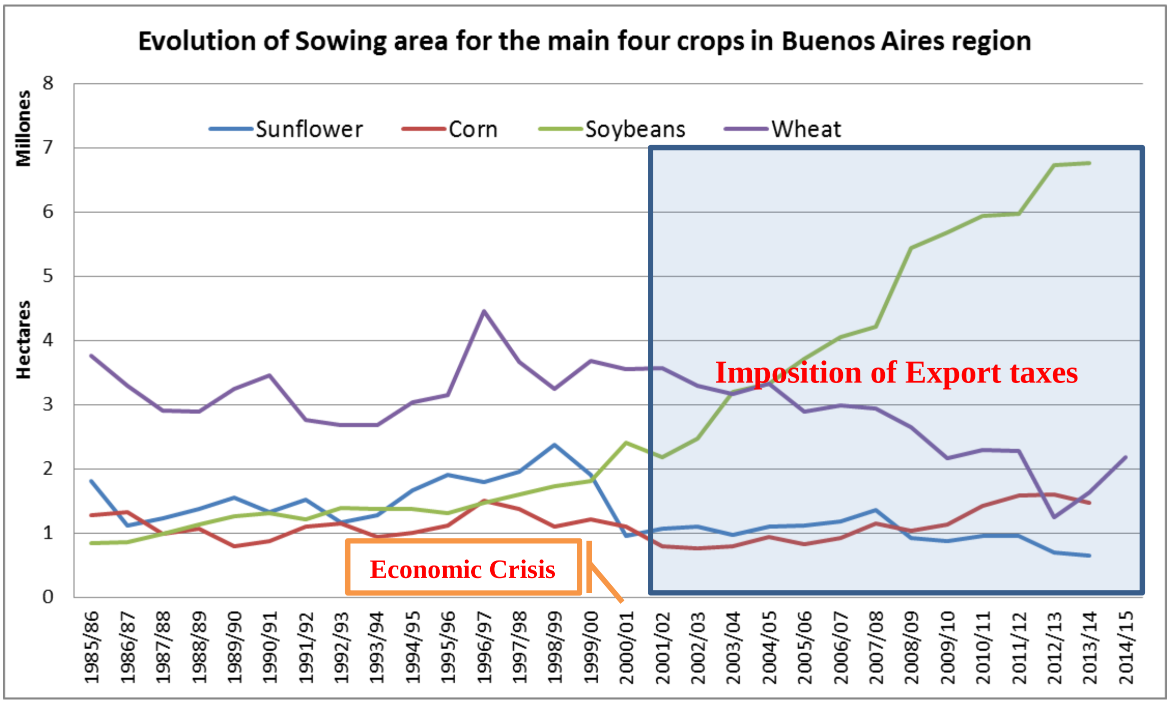


Figure 2-4. Evolution of Sowing Area for the main four crops in Buenos Aires region.

Chapter 3 - Literature review

3.1. Past studies

A starting point to address the topic of ad valorem export tax would be to understand the impacts of policy distortions on the markets. For that purpose, the paper by Piermartini, R. (2004) has a broad analysis of the reasons for government interventions and their consequences for prices and the volume of exports, along with how welfare is redistributed among foreign and domestic consumers, producers and the government. He discusses the differences between "price-setters and price-takers exporting countries", and the long-run and short-run effects of those policies. The author also analyzes the redistribution effects to other sectors of the economy and points out that these effects can vary over time. For the long-run analysis, due to export taxation both supply and demand will turn more elastic, so the tax will affect those factors of production that cannot be reallocated easily. In relation to our case, land is the main factor of agriculture production in Argentina and the export taxes could be affecting it without considering that is not easily reallocated, especially the marginal areas which cannot support other cropping systems and therefore could be left unexploited or under exploited with dubious consequences for the local society and environment.

In an effort to keep inflation rates low some governments use export taxes. Lower input cost for processors will be reflected in lower prices for domestic consumers. However, if the processing industry exhibits oligopolistic power, this benefit may not reach consumers. In Argentina the export tax applied to wheat was justified by the government as a measure to favor consumer's purchasing power (Garriga & Rosales, 2008). After a decade of the implementation of the tax, low food prices have benefited consumers, but wheat production has exhibited low returns for the farmers and an increase in the risk of production (Bertello, 2013).

Nogués (2008) argues that during past decades, the world experienced many changes involving population growth, which led to a food security crisis in some countries. In 2008 rising food prices led to an increase in poverty. Nogués recognizes that there are many factors explaining these events but focuses specifically on the export taxes that were established by many agricultural exporting countries, like Argentina. He explains that these controls are undertaken in an effort to reduce domestic prices, and because they reduce supplies to the world market they are followed by an increase in world prices that exacerbates the problem of food security in importing countries. The main purpose of this paper was to determine whether these policies met their proposed domestic objectives. The conclusion is that the elimination of export taxes established in Argentina would lead GDP to increase by 2 to 4 percentage points and unemployment to decrease by 300.000 jobs (Nogués, 2008, page 2, Table 5). The author suggests that the export taxes should be uniform because differential export taxes weaken the structure of the agro-industrial chain when facing the open market. However, that study did not investigate the potential effects of the proposed variable-rate export tax, which will be analyzed in this thesis.

Another paper (Nogués et al., 2007) reinforces this conclusion using econometric analysis of data from Argentina. They used a general equilibrium model to analyze the impact of eliminating the export taxes on the economy. Their results showed that the export taxes decrease relative prices of the household basket in the short run, leading to a decrease in the poverty level. But 60% of the consumption is in fact concentrated on the top two fifth with higher income, which again is related to the unfairness of the export taxes as a policy to transfer resources, since it seems to be actually transferring those resources to sector which in fact do not need them. On the side of the producers, the tax reduces their revenues and it affects negatively the income of the factors of production, where labor is the most relevant input in many regions. Again, the proposed variable-rate export tax was not explored in that study.

Figueras (2008) argues that the utilization of the export taxes in Argentina has many advantages and disadvantages. He explains that the use of export taxes isolates the country from international food price inflation. Since products are taxed at the ports, which are the end points of agro-industrial chains, (a system of maximum prices is established) without the presence of the illegal market. In addition, revenues collected by the government do not require extensive tax-collecting costs. Furthermore, this type of tax has direct incidence on the producers and suppliers only, and not on consumers, making it more progressive than other types of taxes on revenues. Another point in favor is the “potential” redistribution of revenues across the economy in Argentina. Tax revenues can be reallocated to favor industrial development and help equilibrate the balance between agriculture and other sectors of the economy. The author also states, as a last point in favor of the export tax, that its negative impact on farmers’ revenues could help prevent the expansion of the agriculture frontier to marginal areas with higher production risk and less ecological equilibrium. This point is related to our work in the sense that we analyze how the export tax models affected profit in those marginal regions.

With respect to the disadvantages of the export tax, the author states that it leads to a reallocation of resources that does not follow the comparative advantages of the country, and that it also does not take into account the actual opportunity cost given by the global economy. Another argument against the taxes is that they downsize the agro-economies of the interior provinces of Argentina, which are specialized in agricultural export goods, because an important part of the revenues never reach the local governments or the producers. The destiny of the funds collected by the government is another controversial point of discussion. Finally, the author explains that there is a risk of a potential decrease in production as shown by traditional supply and demand models (the case of wheat and sunflower in Argentina). This last point is also addressed in our analysis, as probability distributions of wheat and sunflower profits and reported acreage assigned to those crops are discussed.

In fact, this latter point has been studied more deeply by (Garriga & Rosales, 2008 . They analyze export taxes from an empirical point of view, and contrast the implemented tax with the legal framework. They claim that export taxes not only represent re-allocations of resources from one sector to another, but that they also generate a welfare cost. The implementation of export taxes lowers the domestic price for the goods being taxed compared with the world price, which is followed by a decrease in production derived from a lack of economic incentives for producers. As a consequence, tax revenues are less than expected and may not compensate the welfare losses to producers These authors also state that in the long run this measure will have a harmful effect on the entire economy. Garrido and Rosales mention that there is a contradiction between the implemented export taxes and the concept of federalism, explained in part because the revenues collected from this tax go directly to the central government rather than to the provinces. Further, the 35% tax on income is based on total revenues gained by producers, which overstates their income because the export tax is removed from the total revenue after the income taxes are levied. The paper summarizes the political reasons to implement export taxes explaining that they arguably represent instruments for the stabilization of prices and inflation rates, empowerment of trade competitiveness, effective protection for novel developing industries, regulation of excess revenues, and finally a better distribution of income.

Sturzenegger A. (2005), from National University of La Plata, Argentina, analyzed historical data to identify and measure the trends of input price distortions known as Direct Rates of Assistance (DRA)[3]. Based on estimated changes in relative prices, the author measures the direct and indirect rates of assistantship to the agricultural sector and to the rest of the economy. The rental rate per hectare (RRH), also denominated Gross Margin per hectare (Gross revenues minus direct cost of production), depends upon four variables mainly (disregarding weather), which are the international market price, the multilateral exchange rate , the indirect protection to agricultural inputs and total factor productivity (TFP). The regression analysis shows that if the international prices increase so does the level of total taxation of agriculture (including export taxes), compensating the RRH. When the multilateral exchange rate is low, inputs are less expensive, so the RRH increases. Finally, if TFP increases so does the export taxation.

Following the same reasoning as Nogués and Porto (2007), Rosales and Garriga (2008), and Figueras (2008), Nogués (2008) explains that the decrease in the price received by producers is followed by a decrease in total factor productivity and an increase in consumption. As a result, there is a welfare loss in the producer and consumer surplus, which can be understood as the cost of implementing export taxes. The author also explains the arguments used by decision-makers to justify export taxes: increase in tax revenues to finance government's expending, price stabilization, re-distribution of revenues across sectors, and promotion of other industrial sectors of the economy.

3 The Direct Rate of Assistance (DRA) indicates agricultural direct input price distortions, as the difference between the distorted observed domestic Price and the opportunity undistorted price.

Fulginiti and Perrin (1990) present an in-depth economic analysis of the effects of export taxes, among other price controls, on the productivity growth of seven output categories that represent over 70 % of total agricultural production from 1940-1980 (page 280). The authors´ objective was to examine the effects of price controls on Argentine productivity growth, and evaluate the effect of different types of tax policies. They used an economic model with a profit function of the seven outputs to calculate elasticities. The results showed that ad valorem export taxes may have reduced total output by 10% for beef, 15% for soybeans and 25% for other crops (table 4 and page 284). They explain that trade-related policies, including export taxes, have been the most distortive policies that affected agricultural prices. They concluded that elimination of the export taxes would have increased output by 15% for beef, 30% for wheat, corn and almost 100% for soybeans. According to their findings, the price effects of those policies explained the slow rate of growth in the agriculture sector from 1940 to 1980 in Argentina. A question that arises is how different these elasticities would have been with different models of export taxes.

Fulginiti and Perrin (1993) also analyzed price interventions in developing countries, like Argentina. They measured the allocative deadweight losses by making modifications to the Allais and Debreu model using data from 1960 to 1984. They concluded that price interventions in the short run cause a deadweight loss of 7.5% in output and input, and in the long run the values are even higher. Another piece that explored the impact of export taxes on the economy is Zincenko, F. (2005), who estimated the effect of eliminating the export taxation in Argentina on the consumer price index. He showed that the taxation decreased the index by 4.12%, and if the tax were eliminated the index would increase by 4.52%.

Regarding productivity and the gross margin in Argentine agriculture, Miguez (2002) explains that the increase in input costs and the reduction in output price received by farmers due to export taxation worked against farmers' profits. Depending on the soil productivity potential, that leaves farmers, on average across regions, with only 8% to 12% of the total income they would have received without the tax. However, regional differences might generate different results but Miguez focused only on the national average.

Ingaramo, J. (2000) used a theoretical model to measure profitability of four crops (wheat, corn, soybeans and sunflower) in Argentina from 1991 to 2000. He investigated connections between variables that could explain the behavior of the farmers. He calculated the rent as the difference between market value of production and the sum of the direct cost, overhead cost and interest on capital. He aggregated the four crops to show the rent as a whole for each year. The author concludes that the rent was unstable and that the farmers adjusted the production cost according to the international prices during the decade analyzed. The total direct cost of production increased during the decade especially the direct cost. He also argues that the farmers maximized their rent through the increase in acreage rather than increasing yields or decreasing production cost.

Again, a more disaggregated analysis which would allow us to understand the impact of export taxes across different regions and crops would shed more light on farmers' planting decisions as returns change. Podestá, Weber, and Laciana (2008) simulated possible outcomes for farmers' choices and risk preferences in order to examine the optimal land allocation among different crops. They showed that these optimal actions differ, especially for tenants, for different parameters and objective functions. In their analysis, they used "net prices" (i.e. with export taxes already deducted). It would be interesting to see how the results change under a variable export tax model rather than a fixed export tax model, and under a control model without export taxes.

Rodriguez and Arceo (2006) use another framework to calculate agricultural rent that considers international cost differences created by natural soil quality differences (better quality would lead to lower production costs or higher yield or both). They measure the rent as the difference between local prices (cost), including direct cost and interest on capital investment, and international prices. They included the export taxes in the analysis, arguing that the purpose of introducing this tax in Argentina is to retain the rent from the farmers but not the profits, given that the rent is not needed to be reinvested for future production. In this article they also used aggregated data at the country level, as in Ingaramo (2000), leaving the opportunity for further studies to analyze the evolution of the rent and profits of farmers in different regions.

Fernández (2008) explores differences in profits earned by low-acreage farmers and large-scale farmers in his analysis of the incidence of government policies on the production concentration in Argentine agriculture between 1989 and 2001. His findings show differences in profits earned by different types of farmer. Both face the same price with the same percentage of export tax discount, meaning that large-scale firms earn between 20% and 60% more than low-acreage farmers (whose profits were actually negative). He also showed that this situation causes the expulsion of many productive units, leading to land and production concentration. Plasencia, 1995, explained that export taxes in Argentina should only tax the rent and not farmers' profits. In the long run, if these taxes withdraw rent and profits, it will make agriculture relatively less attractive compared to other activities, generating a deficit in the level of investment and leading capital to fly to more profitable sectors.

All existing studies on export taxes focus on their impacts on farmers' rents, profits, and productivity. However, no research has investigated how different models of export tax can impact the probability distribution of farmers' profits and hence their risk. The

“Agricultural Risk Office” (ORA, in Spanish) of the Department of Agriculture, Cattle and Fisheries of Argentina investigate this point. ORA provide a web-based Monte Carlo Risk simulation that analyzes the risk involved in a particular crop budget. This system allows users to enter the parameters of their farming operation and, based on historical data, generate the probability distribution of their net margin. As explained in the ORA website, the main objectives of the simulator are to provide a tool for estimating the risk involved in developing a farming activity in a given area, doing feasibility analysis, calculating expected gross margins (SGM) for different crops and livestock farming activities, testing various scenarios before making decisions, and finally comparing expected results and the variability of different agricultural activities. In contrast with our analysis this system does not give the possibility of testing different models at the same time and only retrieves the probability distribution parameters without differentiating between downside risk and upside profit opportunities. Furthermore, for the random variables used for the simulations, our analysis includes data from 1985 to the present to create larger data sets from where input probability distributions can be determined.

3.2. Agriculture and the Economy in Argentina

3.2.1. Overview

Argentina is situated in South America and includes many different ecosystems. In these fertile lands, different crops can be grown throughout the year, as, for example, wheat in winter/spring and soybeans or maize later in the summer/autumn. Agriculture gave the country a source of wealth which allowed the development of the industrial and service sectors. Nowadays agriculture is still an important source of wealth and revenues, having helped the economy after the last economic crisis of 2001 (see increases in GDP and employment in Figure 3-1, Figure 3-2 and Figure 3-3). After the new government took office in 2002, export taxes were applied in order to generate revenues for the government. Increasing export taxes was the easiest way to generate more revenues in an economy with large illegal markets, including in the agricultural sector.

Enforcing the payment at the ports and customs was easier than imposing other types

Figure 3-1. Argentine Gross Domestic Product in billions of U.S. dollars. Source: www.tradingeconomics.com, World Bank Group.

of taxes at the farm level or along the supply chain, where illegal markets operate.

Figure 3-1 shows the GDP level starting in 1985. The first period from 1985 to 1990 is related to the first democratic government after the military coup of 19??. The economy struggled to expand and ended with a hyperinflation s that can be seen in the first burst in the GDP line. After this crisis, new presidential elections and a new economic cabinet gave birth to the so called "Convertibility plan," (Rapoport, 2000) which pegged the peso to the US dollar (one US dollar equaled one peso) and export taxation was almost eliminated (only a 3.5% tax on some primary non-processed grains remained).

The economy grew until 1998, when the national accounts and debt started showing heavy burdens. During these years (1998-2002), the agricultural sector expanded its output thanks to the introduction and development of new technology. This period ended in the most significant economic and social crisis that the country has ever faced. The year 2002 was a turning point. The country defaulted on its debt and devalution of the currency occurred. The next ruling coalition established that export taxes would subsidize government spending. With the new macroeconomic fundamentals (i.e. devaluation of Argentine pesos and increasing world demand for commodities), agricultural output expanded along with tax revenues. When the government again raised the export taxes in 2008, it triggered a strong reaction by farmers. A strike that lasted almost eight months , combined with the effects of the US sub-prime mortgage crisis, seem to have led to a decrease in GDP level (Figure 3-1and Figure 3-2).

While the agricultural sector generates employment in large areas of the country, the main sources of employment in Argentina are the industrial and service sectors. These sectors receive part of the reallocation of resources through the export taxes that boosted household consumption in the country. The unemployment rate, that reached 21 percent during the 2001/02 crisis, decreased steeply and officially remains below two digits (Figure 3-2).

Figure 3-3. Argentina percentage Unemployment rate (2002 – 2014). Source: www.tradingeconomics.com / World Bank Group, based on data from INDEC (Census and Statistic National Institute).

During this period (2001/2011), the prices of most of the Argentinian commodities and processed agriculture goods (i.e. Biodiesel, soybean / sunflower oil and meal) increased steadily until 2008 when they reached historically high levels (Figure 3-4). A significant part of the revenues from exports were withdrawn by the export tax from the agricultural and agro-industrial sector in order to be transferred to other sectors of the economy (Nogués et al., 2007).

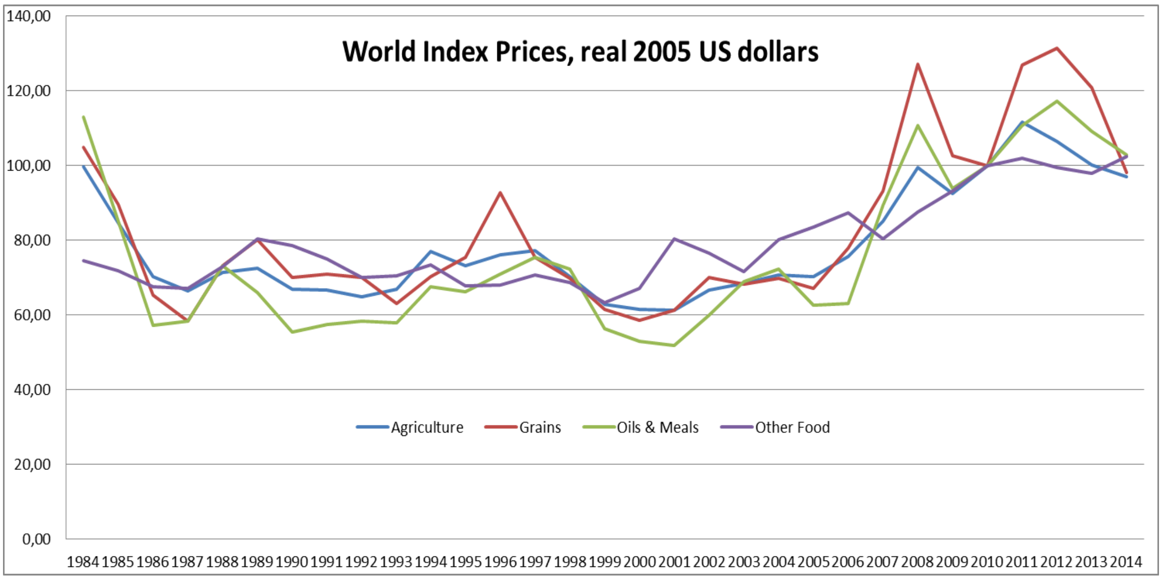


Figure 3-4. World Bank price Index. Annual Real US Dollars, 2005 (Pink sheet). Source: own elaboration based on World Bank Commodity Price Data (The Pink Sheet). Updated on January

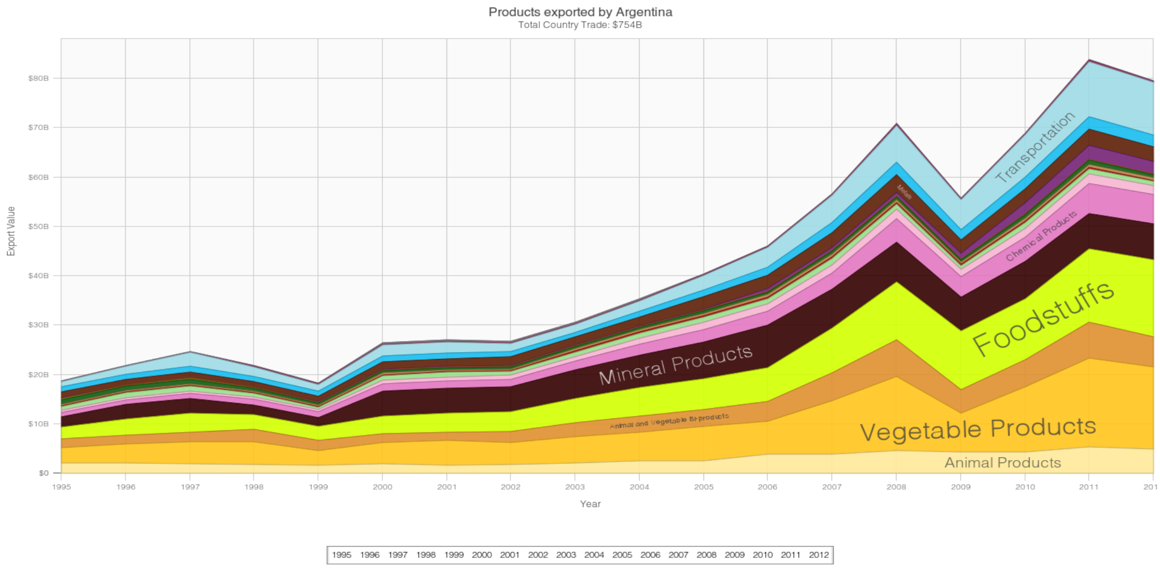


Figure 3-5. Products exported by Argentina, from 1995 to 2012, in billions US dollars. Source: Observatory of Economic Complexity (OEC). http://atlas.media.mit.edu/explore/stacked/hs/export/arg/all/show/1995.2012/.

The primary sector in Argentina has always been an important sector of the economy and a big participant in international markets. Argentina's main exports come from the agricultural and animal sectors, especially food stuffs and vegetable products and bi-products, which account for more than half of total exports and still constitute a main source of wealth for the country (Figure 3-5).

During the sample period of this thesis (1985 / 2014), agricultural output has grown steadily (Figure 3-6), particularly since the introduction of Glyphosate-resistant soybeans and the extended use of non-tillage sowing systems and double cropping of Wheat-Soybeans. The technological innovations allowed for higher yields and the extension of the agricultural frontier to marginal regions for all crops. Yields show an incremental trend since 1987 (Figure 3-6).

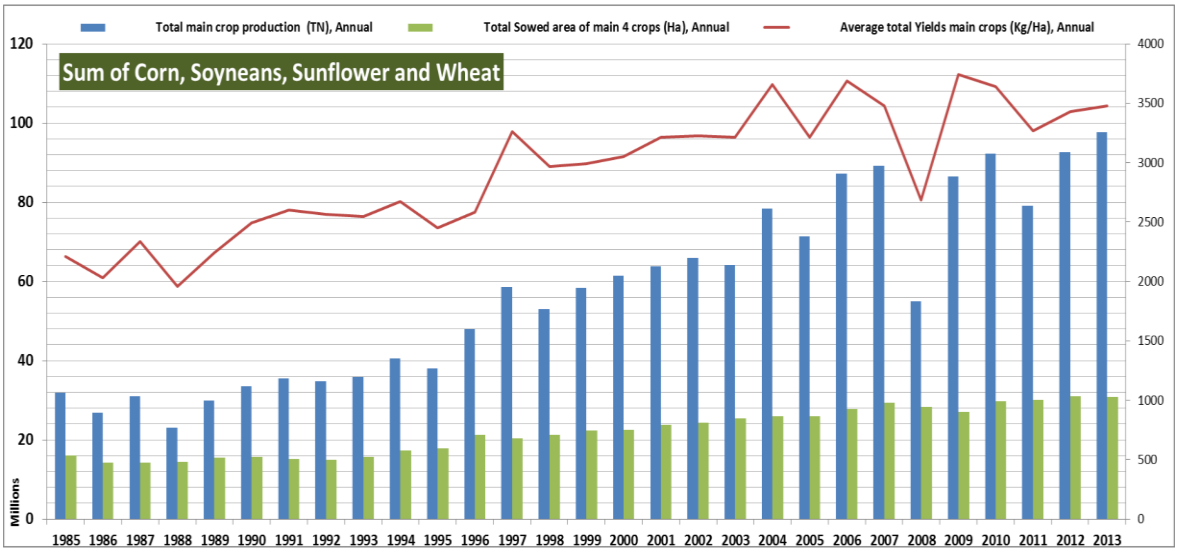


Figure 3-6. Main 4 crops production (million metric tons), yields (Kg/Ha) and acreage (Ha),1985 to 2013 in Argentina. Source: own elaboration based on data from “Integrated Agricultural Information System”, Ministry of Agriculture, Cattle, and Fisheries”, MAGYP

3.2.2. Recent History and Events

Government income coming from export taxes has been increasing over the years, reaching 55.5 billion pesos in 2013 (at a 2013 average exchange rate of 5.4670 pesos/dollar, this represents 10.145 billion dollars) (Figure 3-7). This means export taxes accounted for roughly 6% of total government revenue in 2013, against peaks of 9% during the early 2000's.

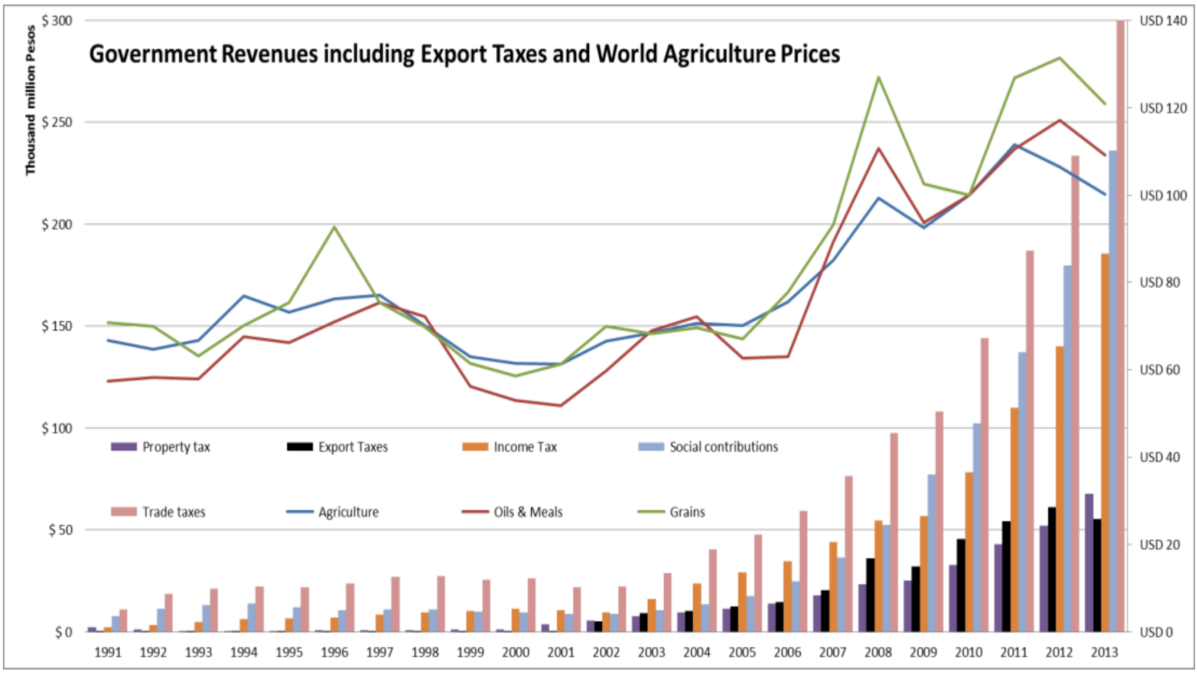


Figure 3-7. Government revenues including Export Taxes and World Price Agriculture Prices. Source: own elaboration based on World Bank Commodity Price Data and Department of Research & Fiscal Analysis of Argentine Nation.

The economic crisis in 2001 brought political and economic unrest to Argentina. In 2002 the annual inflation rate reached 40.9 percent, and then slowed down the next few years. But in 2007 the Government coalition decided to change the official methodology to measure statistics at the INDEC (National Statistic Department), generating uncertainty among the general population and markets. In addition, the expansion of the money supply to support government expenditures boosted the inflation rate (Figure 3-8), with official and unofficial (Opposition Coalition Party Statistics) measures differing substantially. Rising inflation also

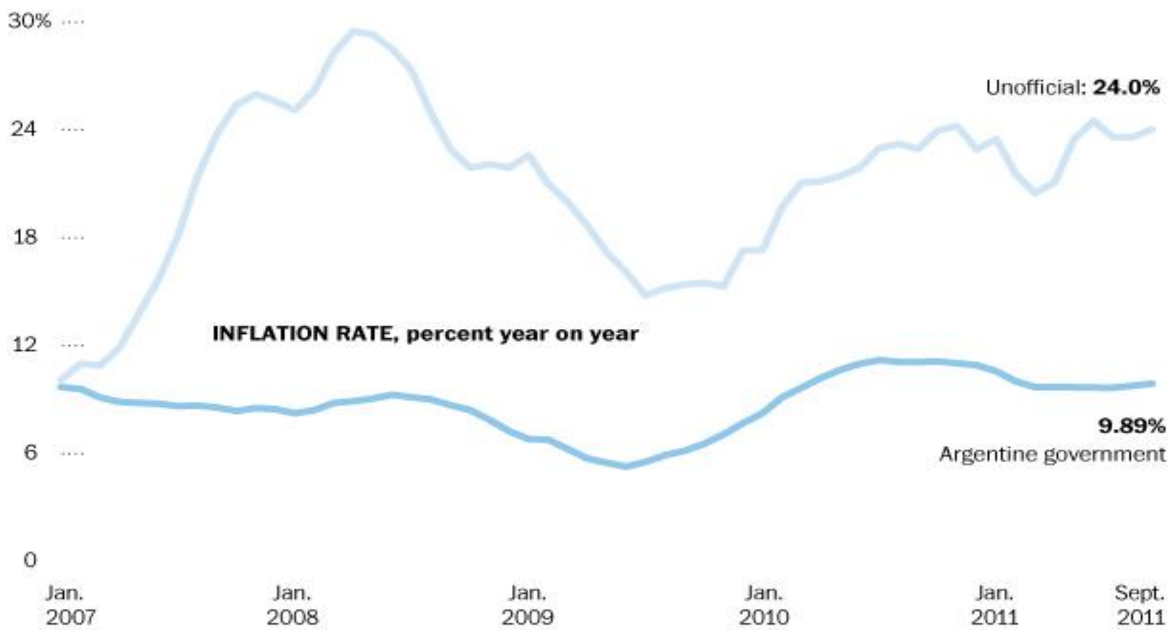


Figure 3-8. Argentine inflation rate in percentage (2007 to 2011). Source: Washington post. Published October 31, 2011.

affected farmers, increasing their cost of production. Higher export tax rates and rising cost of production were making farmers increasingly unhappy with the government. In addition, there was a general perception that revenues from export taxes were spent on populist programs to boost government support among the population, while no investments were made on infrastructure and no extra credit was made available for the agricultural sector. To make matters worse, the government established export quotas and restrictions on wheat, corn and meat in 2006, reflecting an even more restrictive and distorting trade policy (Nogués et al., 2007)

Farmers' dissatisfaction grew to a point where they started a so- called "Farm Rebellion" in 2008, when the four main Unions declared a strike (SRA, CONINAGRO, CRA, FAA, acronyms in Spanish). The tipping point was the proposed Government Bill

(Resolution Nº 125/2008) presented by the Ministry of Economics which stablished a system of mobile scale for ad valorem export taxes on primary commodities. This mobile scale represented a variable-rate tax, such that the amount charged from farmers would vary depending on the FOB price, i.e. higher (lower) prices would lead to larger (smaller) tax rates.

The rebellion lasted for 129 days. During that period, national economic activity suffered, making the effects of the international crisis even stronger. Inflation kept increasing, national industry lost competitiveness, INDEC (National Census and Statistic Department) was investigated due to alleged manipulation of official statistics, investments were reduced, and risk perception increased (Rozenwurcel and Vazquez, 2009, page 2). The rebellion finally came to an end as the government announced several measures supported by farmers, such as the rejection of the variable-rate export tax (mobile scale), liberalization of meat exports, development of cattle and meat strategic plans, and several programs and subsidies to help farmers.

Interestingly, the variable-rate export tax (mobile scale) was proposed and discussed during a very turbulent period, both politically and economically. It is not clear whether it was well understood by farmers. Evidence suggests that farmers and their representatives in Congress were determined to reject any proposal from the government. It remains to be seen how the variable-rate tax compares to the fixed-rate tax in terms of farmers' profitability and risk

.

3.2.3. The Export Taxes:

3.2.3.1. A Mobile Scale model proposal

Export taxes have traditionally been set in Argentina at a fixed rate. The government determines a certain percentage to be charged on the price of the commodity, regardless its market price. In that model, taxes charged would increase (decrease) in dollars (pesos?) for higher (lower) international prices/FOB at export ports, but the price received by farmers would always be a fixed proportion of the international price/FOB (Figure 3-9).

Figure 3-9. FAS price - FOB price transfer in an Economy with fixed export taxes. Source: www.econlink.com.ar

In 2008, a different model was proposed by the government, using a mobile scale that changes the percentage charged according to the international/FOB price. Essentially, the government was proposing a variable-rate tax, such that higher (lower) international/FOB prices would imply proportionally larger (smaller) charges in dollars. Hence, the price received by farmers would represent a smaller proportion of the international/FOB price as prices increased (Figure 3-10).

Figure 3-10. FAS price - FOB price transfer in an Economy with a Mobile Scale of export taxes. Source: www.econlink.com.ar

The variable rate (mobile scale) proposed by the government is determined by equation [3-1.

$$d = \frac{VB + AM\,(FOB - VC)}{FOB} \times 100 \qquad [3\text{-}1]$$

Where "d" is the export tax rate (in percentage); VB is the basic value; AM is the marginal tax; VC is the cutout value; and FOB price is the official price determined by the Ministry of Agriculture, Cattle and Fisheries of Argentina (MAGPYA). The values of VB, AM and VC were determined by the government for different price ranges for each crop, as can be seen in Table 3-1. For example, these values for wheat are VB = \$40/TN, AM = 32% and VC =

$200/TN when the international/FOB price ranges between $200/TN and $300/TN. VB represents a starting value to calculate the tax rate, which is added to a percentage (AM) of the difference between the international/FOB price and the lower bound of the price range (VC). If the international/FOB price is $250/TN, the numerator of equation 1-1 will be $40/TN + 0.32($250/TN – $200/TN) = $40/TN + $16/TN = $56/TN. Hence, the tax rate will be ($56/TN)/ ($250/TN) = 22.4%. As can be seen in Table 3-1, the values of VB and AM determined by the government increase for higher price range, such that the tax rate also increases as the international/FOB increases. Unfortunately, the Government never explained how it determined the values for VB and AM.

Figure 3-11 is an example of how the variable-rate export tax works for wheat. The chart on the left of Figure 3-11 shows how the different taxation models affected the price received by farmers (vertical axis) compared to the international/FOB price (horizontal axis). Without export taxes, the price received by farmers would be the same as the international/FOB price (orange dotted line). With fixed-rate export tax, the price received by farmers would be a fixed proportion of the international/FOB price (continuous line). Then, with variable-rate export tax (following values from Table 3-1), the price received by farmers would be a relatively smaller proportion of the international/FOB price as it increases (red dotted line). The chart on the right of Figure 3-11 shows the percentage export tax rate in each model on the vertical axis and the international/FOB price on the horizontal axis. The fixed-rate model exhibits a horizontal line representing the fixed percentage charged on the international/FOB price. The variable-rate line, on the other hand, shows a relatively flat rate for lower international/FOB prices and then increasing rates as international/FOB prices increase beyond a certain level. Up to a certain point, the fixed tax rate is greater than the variable tax rate, but beyond that point the variable rate becomes increasingly greater than the fixed rate.

This mobile scale was proposed by the Argentine Government in 2008 and sent to the National Congress (“Resolución 125/2008,” 2008). This Bill did not pass the voting process and was discarded (Casarini, 2009). The Congress voted on this bill under the strong influence of the economic and political turmoil in the country, which might have affected its chances for approval. Our interest is to analyze how this variable-rate export tax would have impacted farmers’ profitability and risk if it had been applied.

Table 3-1: Mobile Scale (Variable-rate) of Export taxes for Wheat, Soybeans, Corn and Sunflower.

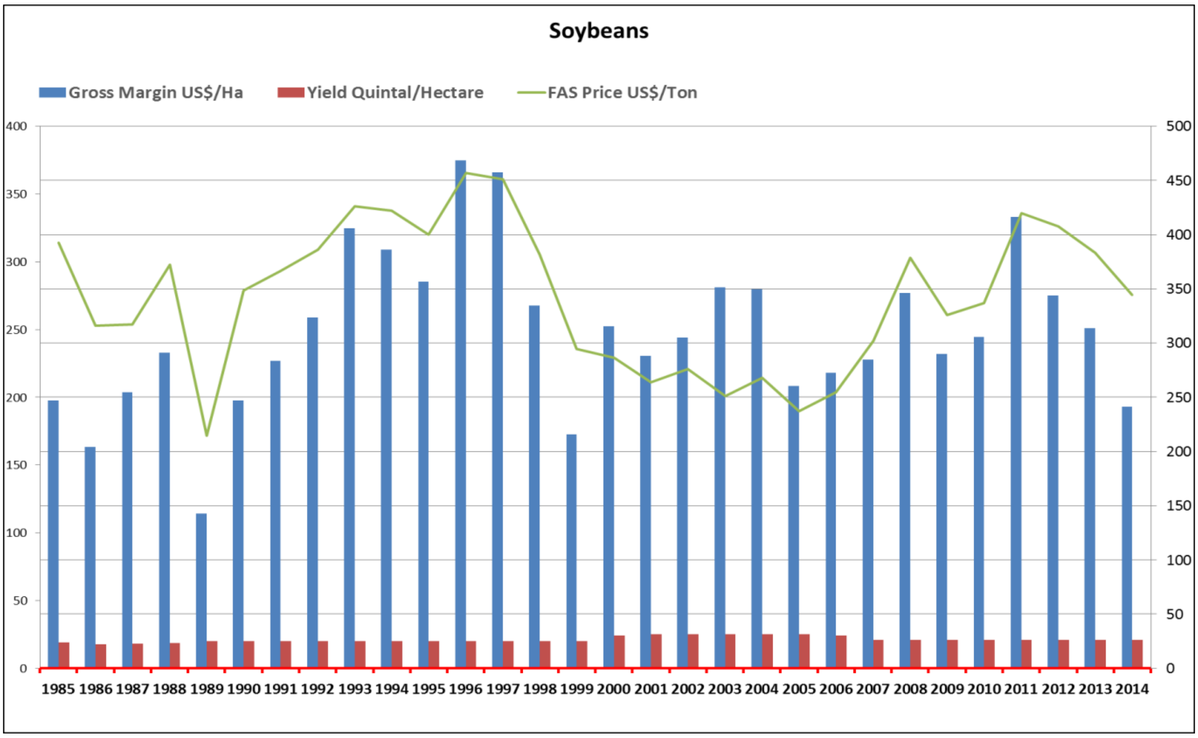
FOB price range (US$/TN)		**VB (US$)**	**AM (%)**	**VC (US$)**
		Wheat		
> than	<= than			
0	200		20	
200	300	40	32	200
300	400	72	48	300
400	600	120	79	400
600	or more	278	95	600
		Corn		
> than	<= than			
	180		20	
180	220	36	45	180
220	260	54	72	220
260	300	82.8	93	260
300	or more	120	95	300
		Soybeans		
> than	<= than			
	200		23.5	
200	300	47	38,0	200
300	400	85	58,0	300
400	500	143	72,0	400
500	600	215	81,0	500
600	or more	296	95,0	600
		Sunflower		
> than	<= than			
	200		23.5	
200	300	47	29	200
300	400	76	39	300
400	500	115	54	400
500	600	169	78	500
600	or more	247	95	600

Source: Resolution Bill 125. Honorable Argentine National Congress.

Figure 3-11. Wheat fixed and mobile scale export tax models. Source: own elaboration.

3.2.3.2. Effects of export taxes on the economy, producers and consumers

Due to the rising inflation rate, increased costs, the shutdown of importation, and other economic factors, some agricultural industries in Argentina had lost profits, and exhibited decreases in the level of production in some crops, in its level of agricultural exports and in the investment and usage of factors of production. As can be seen in the **¡Error! No se encuentra el origen de la referencia.** the gross margin in soybeans (sowed from October and harvest in May), had been dependent especially on the price and secondly on the yields. **¡Error! No se encuentra el origen de la referencia.** shows the entire Argentine soybean production and the average Harvest FAS price at Argentine ports and the country average yield obtained. This crop since its introduction in the country in 1976 has continually grown in extension. It has replaced crops in the best plots and also replaced cattle



and pasture in marginal areas.

Figure 3-14, 3-14, 3-15 and 3-16 show the relationship between prices, government revenues from export taxes and the gross margin net of the opportunity cost of the capital investment. . FOB and FAS prices are in US dollars per ton. These graphs show the average for the entire country. The difference between the FOB and FAS prices is the sum of the per unit amount withheld by the export tax plus the per unit exporting cost of handling the merchandize at the port. The series start in 1985 with low international prices for these four main commodities. After the hyperinflation crisis of 1989/90 and a new macroeconomic plan, the export taxes were almost completely removed. This situation allowed the farmers to receive full world prices with only the deduction of exportation costs. This period exhibited a continuous increase in production of the main crops as was previously explained. After the 2001 crisis the export taxes were applied again in February 2002 and raised in November 2002, February 2007 and November 2007. These increases followed the increase in the world prices of these commodities but when these commodity prices decreased again the export tax did not fall.

The Gross Margin is a measure of the return to the economic activity. It is simply the difference between the Gross Revenue (price multiplied by quantity produced) and the direct cost of production which includes the marketing cost, the harvest cost, the tillage, labor, fertilizers, and agrochemicals cost. After adding in an opportunity cost for capital we get total costs which subtracted from gross revenue to get the gross margin.

The charts have US$ per hectare on the vertical axis but FOB prices are not measured in dollars per hectare; they’re measured in dollars per ton.

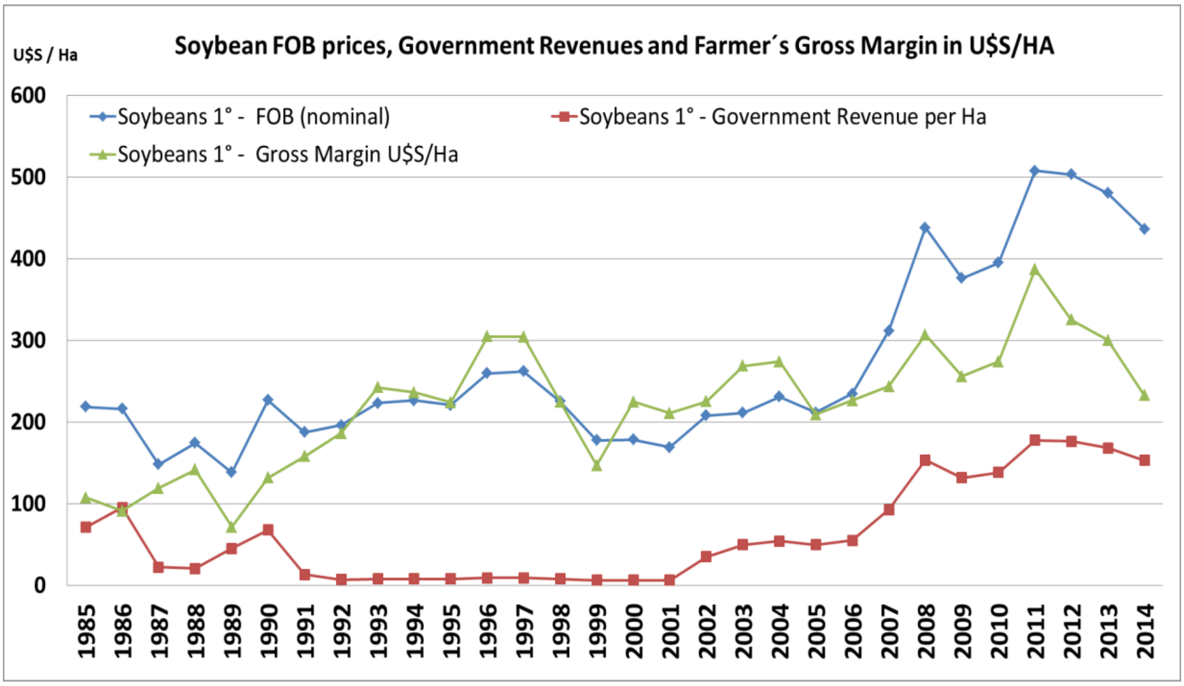


Figure 3-12. Evolution of Soybean FOB price, Government Revenues and Gross Margin after interest as an average of the entire production in Argentina. Source: own elaboration with data from specialized Magazine “Margenes Agropecuarios”.

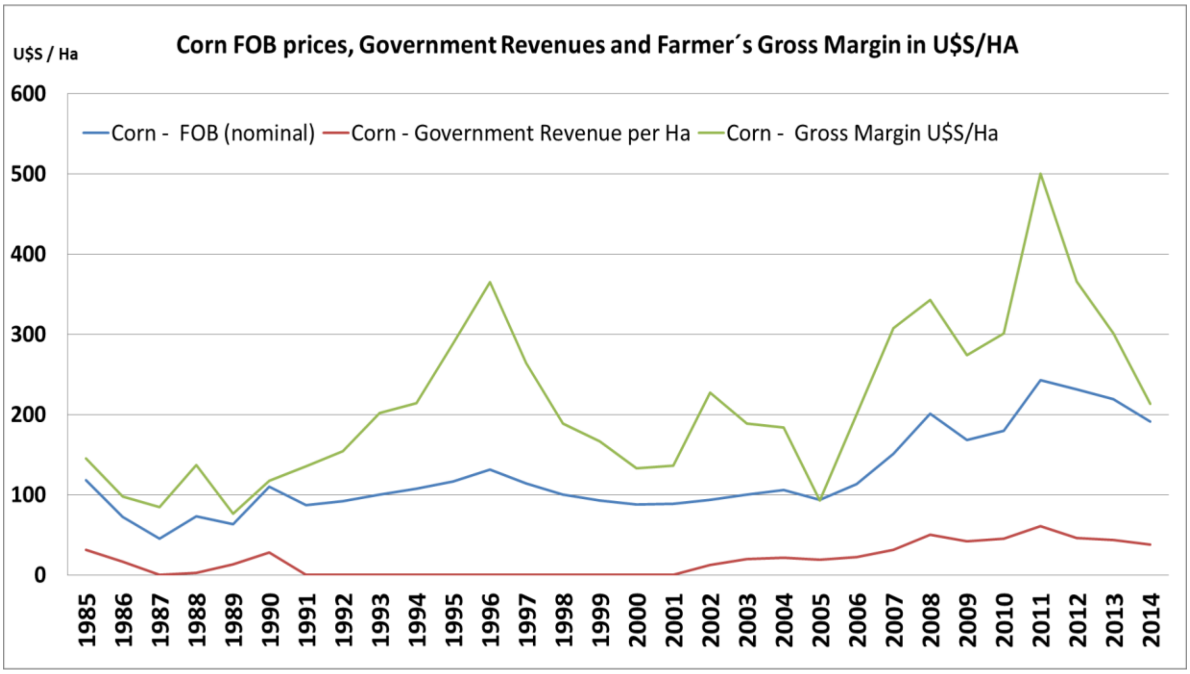


Figure 3-13. Evolution of Corn FOB price, Government Revenues and Gross Margin after interest as an average of the entire production in Argentina. Source: own elaboration with data from specialized Magazine “Margenes Agropecuarios”.

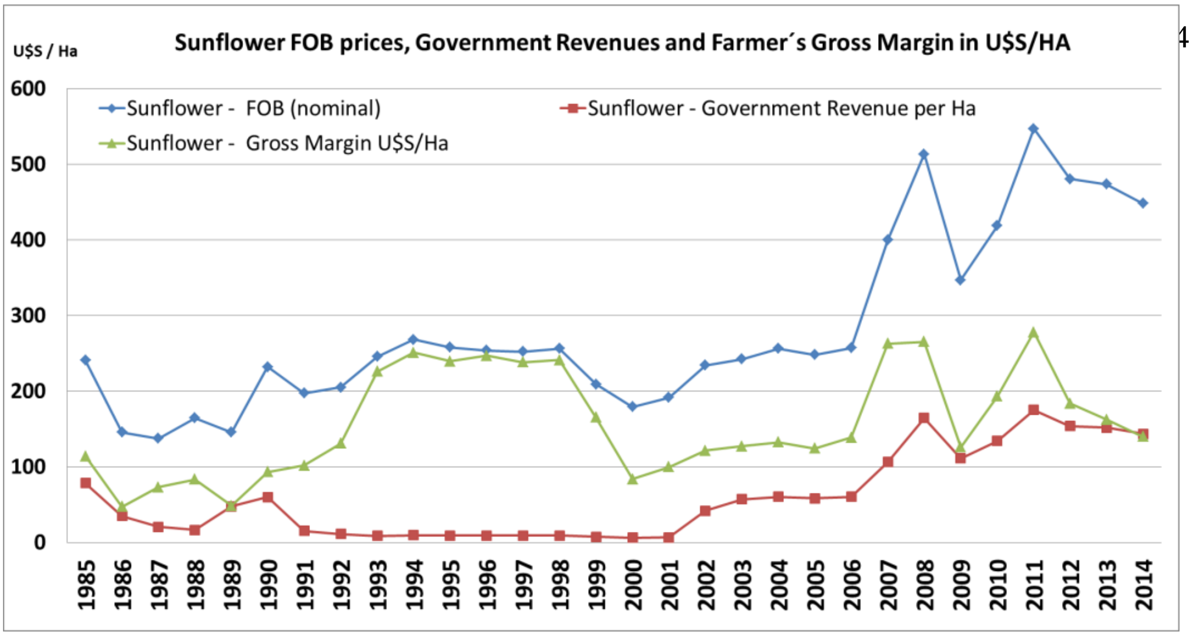


Figure 3-14. Evolution of Sunflower FOB price, Government Revenues and Gross Margin after interest as an average of the entire production in Argentina. Source: own elaboration with data from specialized Magazine "Margenes Agropecuarios".

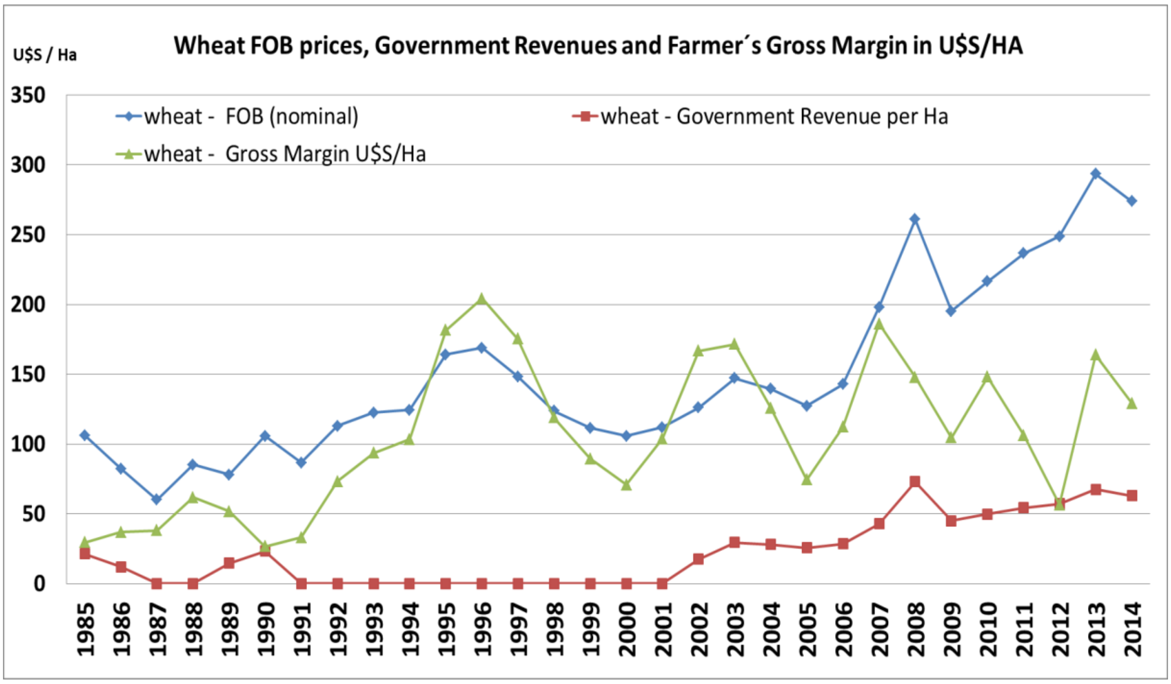


Figure 3-15. Evolution of Wheat FOB price, Government Revenues and Gross Margin after interest as an average of the entire production in Argentina. Source: own elaboration with data from specialized Magazine "Margenes Agropecuarios".

It is important to remark that the GM is not the profit of the producer. After calculating the direct cost and indirect cost (overhead cost) and subtracting those from the farmer's gross revenues we get net revenues (exploitation result) and after subtracting the federal income tax of 35% we obtain the firm's net profits. In those cases where the land was rented it is necessary to deduct the land-rent cost along with the overhead cost to get the net revenue. Note that approximately 60% of the land is under rent in Argentine agriculture.

Soybean production is mostly concentrated in three regions: South Santa Fe, North Buenos Aires and South-southeast Cordoba. Figure 3-18 presents the evolution of the profits generated by soybeans (sowed in spring). The increase in prices allowed a higher return even though export taxes and costs increased. The last decade was the most profitable in the series.

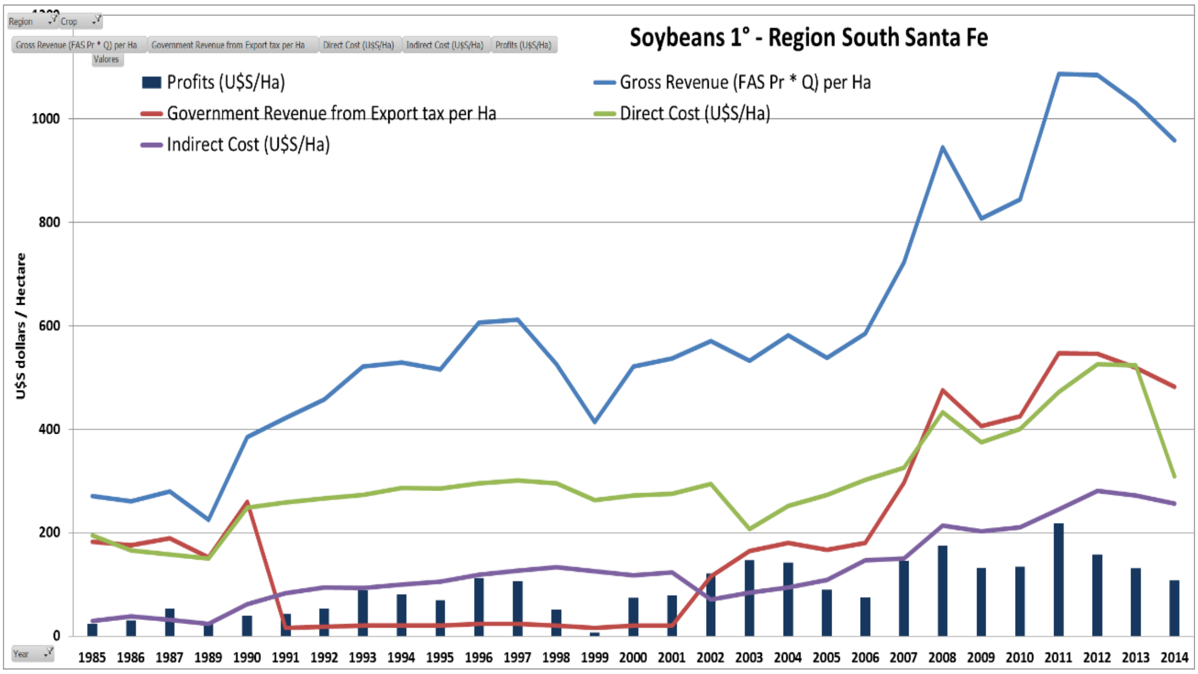


Figure 3-16. Evolution of Soybeans 1° farmer´s Profits, Direct Cost, Indirect Cost and Government revenues, all in USD dollars per hectare, in region South Santa Fe. Source: own elaboration with data from specialized Magazine "Margenes Agropecuarios".

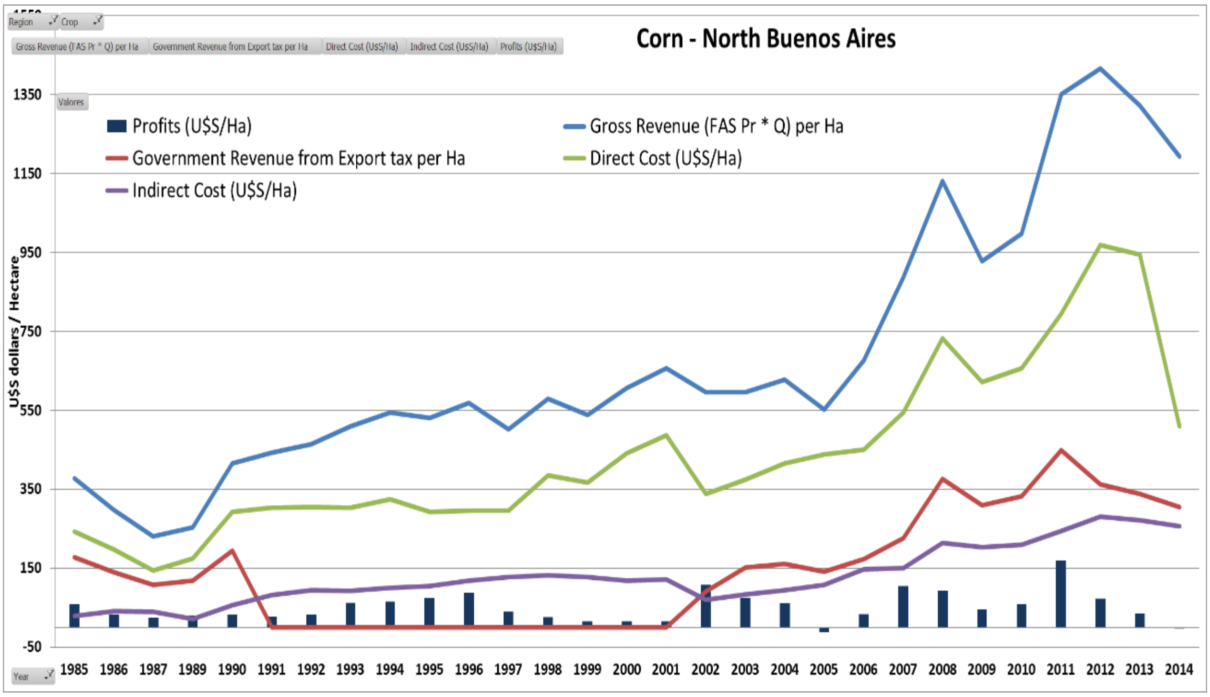


Figure 3-17. Evolution of Corn farmer´s Profits, Direct Cost, Indirect Cost and Government revenues, all in USD dollars per hectare, in region North Buenos Aires. Source: own elaboration with data from specialized Magazine “Margenes Agropecuarios”.

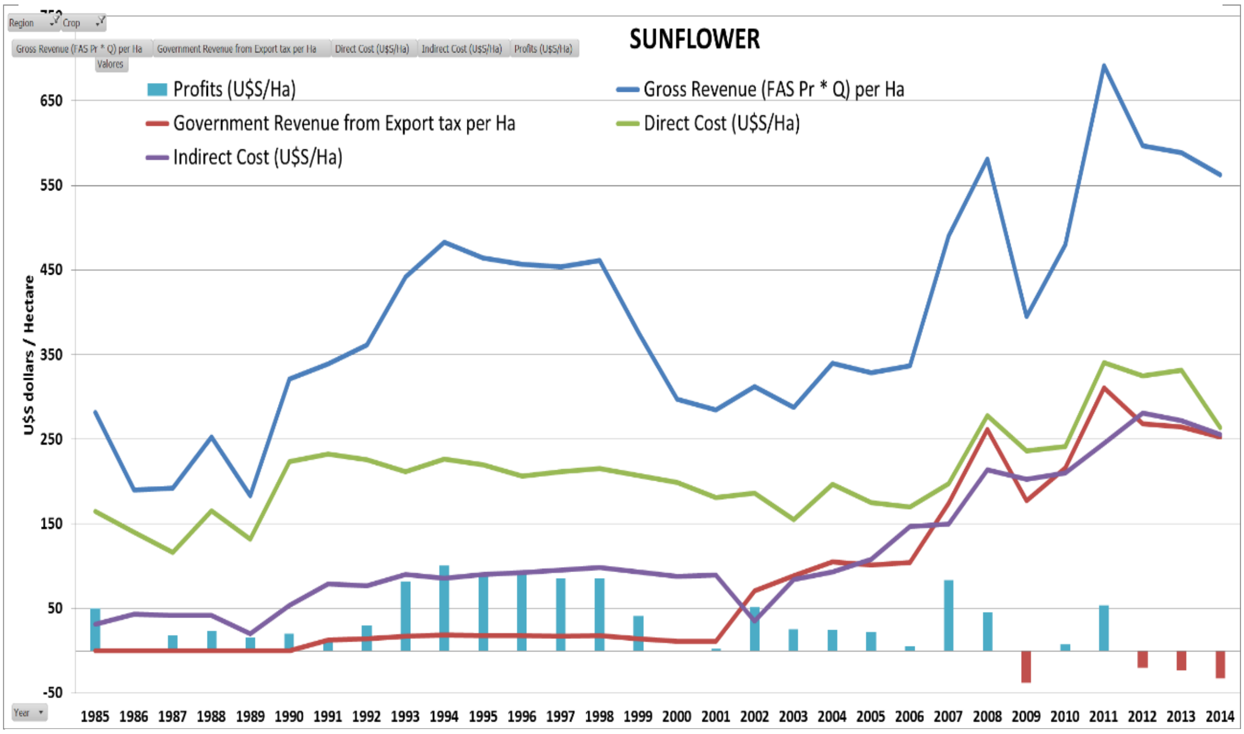


Figure 3-18. Evolution of Sunflower farmer´s Profits, Direct Cost, Indirect Cost and Government revenues, all in USD dollars per hectare. Source: own elaboration with data from specialized Magazine “Margenes Agropecuarios”.

The case of corn is dissimilar from that of soybeans. The profits (Figure 3-19) were positive but lower, and it is important to remark that direct cost in corn is higher than any other crop which increases the production risk. The last years of the series, show a negative trend for profits which were near zero in 2014.

As we can see in Figure 3-20, Sunflower profits where higher during the 1990s (1990s, no apostrophe) and despite the higher prices of the last ten years the profits ended being negative for some years. The increase in the cost of inputs is directly observable from the direct and indirect cost lines, and is related to the decrease in the currency exchange rate that made imported inputs more expensive in Argentine Pesos and due to the escalate in national inflation rate. Meanwhile the Government Revenues from export taxes increased following the increase in world FOB prices.

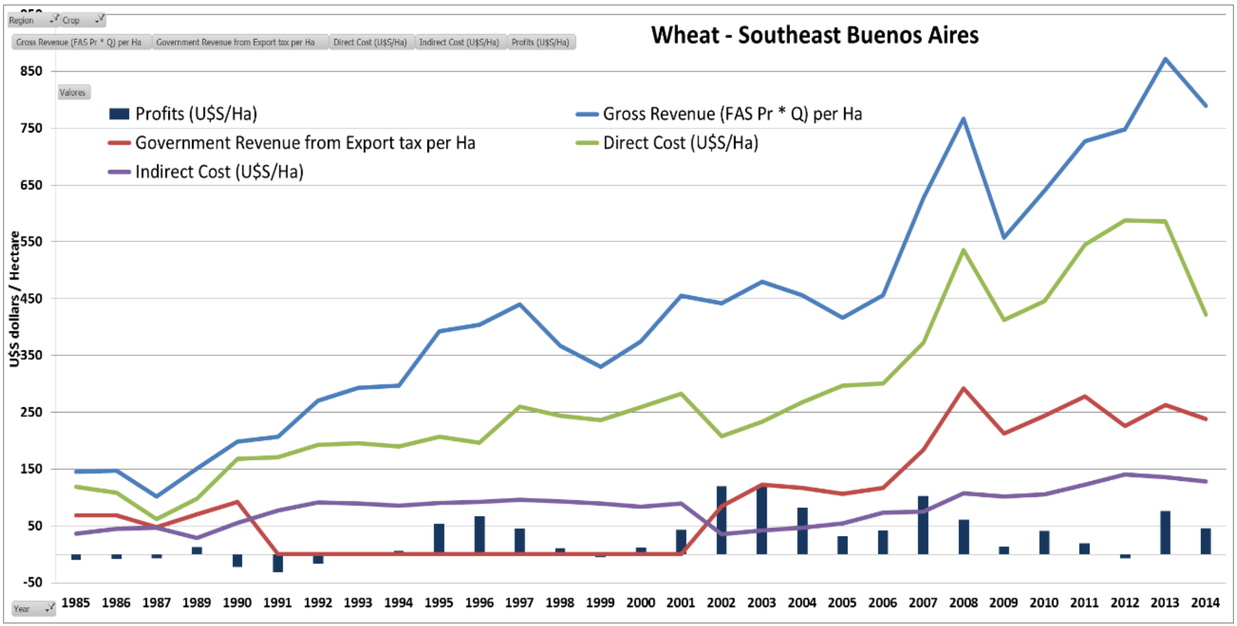


Figure 3-19. Evolution of Wheat farmer´s Profits, Direct Cost, Indirect Cost and Government revenues, all in USD dollars per hectare. Source: own elaboration with data from specialized Magazine “Margenes Agropecuarios”.

Finally the case of Wheat is similar to the Corn (Figure 3-21), with large variability in profits despite higher prices.

Chapter 4 - Data

The data for the four major crops in Argentina were obtained from different sources. The FAS prices, marketing costs, direct costs and gross margins were obtained from “Margenes Agropecuarios”. Crop production, county and state crop average yields, crop harvest prices and acreage were gathered from the website data base “Agricultural Integrated Data System” (SIIA as the acronym in Spanish) from the Argentine Ministry of Agriculture, Cattle and Fisheries (MAGYP as the acronym in Spanish). The exchange rate between U.S. dollars and Argentine pesos was obtained from United States Department of Agriculture (USDA), Economic Research Service (ERS). All monetary values in Argentine pesos were converted to U.S. dollars, and then all values in U.S. dollars were adjusted for inflation based on the consumer price index obtained from the US Bureau of Labor Statistics (BLS).

A time series of Export Tax rates was also constructed using data from different sources, as indicated below.

- Soybeans: for November 1985 the source was the United Nations’ Economic Commission for Latin America and the Caribbean–ECLAC (http://repositorio.cepal.org). The rest of the series was obtained from “Oil Argentine Industry Board (CIARA as the acronym in Spanish) website, statistics department.
- Sunflower: for November 1985 the source was ECLAC (http://repositorio.cepal.org). From 1986 to the present the source was “Oil Argentine Industry Board (CIARA as the acronym in Spanish) website, statistics department.
- Wheat: for November 1985 and the whole 1986 the source was “Los Paises Productores de Cereales Ante la Crisis Agricola Internacional”, page 193,

Ministry of Agriculture, Cattle and Fisheries of the Argentine Republic (MAGPYA as the acronym in Spanish). The rest of the series was obtained from "Oil Argentine Industry Board (CIARA as the acronym in Spanish) website, statistics department.

- Corn: for February, May, August and November 1985 and 1986 the source was "Los Paises Productores de Cereales Ante la Crisis Agricola Internacional", page 193, Ministry of Agriculture, Cattle and Fisheries of the Argentine Republic (MAGPYA as the acronym in Spanish). For 1987 to 1990 data were obtained from Rossi, Inter-American Institute for Cooperation on Agriculture IICA, Argentina. Table 22, page 91. For the period 1992 to 2001 the source was Barsky and Gelman (2001); from 2001 to the present we gathered data from the Argentine Soybean Board, ACSOJA.

"Margenes Agropecuarios" provided quarterly budget sheets for different crops in different regions of Argentina. The variables in those budgets (prices, yields and costs) allow calculating the gross margin (GM) and the profit (π) for each crop in each region. All costs and prices included in the budget sheets are in nominal US dollars per metric ton or per hectare, and were adjusted for inflation to reflect US dollars of 2014. The data were gathered from representative samples of farmers' budgets in each region. For each year and for all the variables we used averages of quarterly data. The values for input usage were updated over the years to reflect changes in technology and agronomic practices. In order not to introduce biases the yield potential was not determined by using the last campaign value and was not modified by weather conditions. Table 4-1 presents an example of a budget sheet for wheat in four regions for May (second quarter), which is divided into four parts (from top to bottom). The first part shows machinery cost and labor used for tillage. The second part shows a list of all direct costs (DC) of production with quantities and respective prices in US dollars. DC includes fixed costs, given that it does not depend on the yield obtained, and its total is expressed in US$/Ha in our model according to equation [4-1]:

$$DC = Till + CH + F + S \qquad [4\text{-}1]$$

where:

a) Tillage cost (Till): depends on the amount and the type of machinery use under the tillage system applied. It differs depending on the crop and the region. This cost also changed through time as new technology was introduced. It includes labor along with machinery use.
b) Agrochemical cost (CH): this variable includes all the herbicides, fungicides, insecticides and adjuvants needed for the production processes. It varies according the management plan suited for each region and each crop.
c) Fertilizer (F) and Seed cost (S): varies according to the management plan suited for each region and each crop.

Table 4-1: Wheat Budget with cost in dollars and calculated Gross and Net Revenue and Gross Margins also in dollar, for the year 2010, performed in May 2010.

Fecha: 3/5/10 **TRIGO: COSTOS Y MARGENES** 63

ZONA DE REFERENCIA		Sudoeste de Buenos Aires		Sudeste de Córdoba		Oeste de Buenos Aires		Oeste de Buenos Aires	
DETALLE DE LABRANZAS	Coef.UTA	cant.	UTA./ha	cant.	UTA./ha	cant.	UTA./ha	cant.	UTA./ha
DISCO PESADO	0,75	2	1,50	0	0,00	0	0,00	0	0,00
DISCO DOBLE	0,54	0	0,00	1	0,54	2	1,08	2	1,08
FERTILIZACION	0,25	1	0,25	1	0,25	0	0,00	0	0,00
FERTILIZACION + FUMIGADA	0,50	0	0,00	0	0,00	1	0,50	1	0,50
DISCO DOBLE c/RD y ROLO	0,75	1	0,75	1	0,75	1	0,75	1	0,75
SIEMBRA c/FERTILIZACION	0,85	1	0,85	1	0,85	1	0,85	1	0,85
PULVERIZACION TERRESTRE	0,25	1	0,25	1	0,25	0	0,00	0	0,00
PULVERIZACION AEREA	0,30	0	0,00	1	0,30	0	0,00	0	0,00
TOTAL U.T.A.			**3,60**		**2,94**		**3,18**		**3,18**

COSTOS DIRECTOS		US$/unidad	unidades	US$/ha	unidades	US$/ha	unidades	US$/ha	unidades	US$/ha
TOTAL LABRANZAS	UTA/ha	28,72	3,60	103,4	2,94	84,4	3,18	91,3	3,18	91,3
SEMILLA	kg/ha	0,30	125,00	37,5	110,00	33,0	120,00	36,0	120,00	36,0
CURASEMILLA	kg/ha	10,70	0,34	3,7	0,30	3,2	0,33	3,5	0,33	3,5
UREA	kg/ha	0,47	80,00	37,2	110,00	51,2	120,00	55,8	65,00	30,2
FOSFATO DIAMONICO	kg/ha	0,62	60,00	36,9	60,00	36,9	100,00	61,5	55,00	33,8
MISIL I	lt/ha	32,70	0,00	0,0	0,10	3,3	0,10	3,3	0,10	3,3
MISIL II	lt/ha	33,20	0,10	3,3	0,00	0,0	0,00	0,0	0,00	0,0
CIPERMETRINA	lt/ha	5,60	0,00	0,0	0,10	0,6	0,00	0,0	0,00	0,0
TOTAL COSTOS DIRECTOS		**US$/ha**		**222,0**		**212,5**		**251,4**		**198,2**

RENDIMIENTOS	**QQ/ha**	**26**	**36**	**25**	**35**	**40**	**50**	**30**	**40**
PRECIO TRIGO ene/11	US$/tn	144,0	144,0	144,0	144,0	144,0	144,0	144,0	144,0
INGRESO BRUTO	US$/ha	374,4	518,4	360,0	504,0	576,0	720,0	432,0	576,0
GS.COMERCIALIZ.	US$/ha	84,6	117,2	72,6	101,6	171,5	214,4	128,6	171,5
INGRESO NETO	US$/ha	289,8	401,2	287,4	402,4	404,5	505,6	303,4	404,5
LABRANZAS	US$/ha	103,4	103,4	84,4	84,4	91,3	91,3	91,3	91,3
SEMILLA+ curasemillas	US$/ha	41,2	41,2	36,2	36,2	39,5	39,5	39,5	39,5
AGROQUIMICOS+fert.	US$/ha	77,4	77,4	91,9	91,9	120,6	120,6	67,3	67,3
COSECHA	US$/ha	28,1	36,3	27,0	35,3	37,4	46,8	30,2	37,4
COSTOS TOTALES	US$/ha	250,1	258,3	239,5	247,8	288,9	298,2	228,4	235,6
MARGEN BRUTO	**US$/ha**	**39,7**	**142,9**	**47,9**	**154,5**	**115,6**	**207,4**	**74,9**	**168,9**

GASTOS COMERCIALIZ.									
DISTANCIA A PUERTO		30+230 km a B.Blanca		30+170 km a Rosario		30+400 km a B.Blanca		30+400 km a B.Blanca	
FLETE CORTO (*) y LARGO	US$/tn	25,64	17,81%	22,12	15,36%	35,97	24,98%	35,97	24,98%
IMPUESTOS - SELLADO	US$/tn	2,23	1,55%	2,23	1,55%	2,23	1,55%	2,23	1,55%
PARITARIA (*)	US$/tn	1,80	1,25%	1,80	1,25%	1,80	1,25%	1,80	1,25%
COMISION ACOPIO	US$/tn	2,88	2,00%	2,88	2,00%	2,88	2,00%	2,88	2,00%
TOTAL GS COMERCIALIZ.	**US$/tn**	32,55	22,61%	29,04	20,16%	42,88	29,78%	42,88	29,78%

Precios y costos sin IVA. En dólares libres, (*) Flete corto y paritaria se pueden compensar con costo de embolsado. **3,90 $/dólar**

Source: Magazine “Margenes Agropecuarios”, May 2010.

The third part of Table 4-1 shows the variables to calculate farmers' gross margins. It starts with the FAS price, which is used to calculate gross revenue (GR) as in equation [4-2], expressed in US$/Ha.

$$GR = Q * FAS \qquad [4\text{-}2]$$

where:

a) Q is the expected yield obtained for each crop in each year and in each region, expressed in TN/Ha. This variable is collected by the magazine from qualified professionals in each region who consider the average yield potential in each of the regions for each of the crops. Those values along with the input usage and its prices are sources of the representative budgets used by farmers in those regions.

b) FAS is the free alongside ship price, expressed in US$/TN, which represents the price received by farmers at the export port. It is calculated as in equation 4-3.

$$FAS = \text{FOB Price} - \text{Export Tax} - \text{Fixed Export cost} - \text{Commercialization cost} \qquad [4\text{-}3]$$

where:

c) FOB (Free On Board) price is the price international buyers are willing to pay for Argentine products at the Argentine ports in US$/TN. There are a series of international commodity markets which are sources of FOB prices, but the most important is the CME Group in Chicago.

d) Export Tax (t) is the ad valorem tax applied to the FOB price and withheld by the customs authorities at the port. The tax rate varies depending on the type of commodity.

e) Fixed export costs are the fixed costs generated in the actual exportation process, such as the crane tax, the FOB Broker Commission, Custom Surveyor, Independent Surveyor, National Food Agency Tax (SENASA in Spanish), Storage and Lifting cost. These costs are not considered in the analysis because there are no data available and their incidence in price formation is of minor significance (according to whom? How would you know this if no data are available?).

f) Commercialization cost: these costs are generated by quality differences in grain, stamps and other taxes, operation registry, broker's commission, inspection analysis, exportation financing cost and value added financing tax cost. These costs are expressed in percentage points that are applied on the FOB price after subtracting export taxes. These costs vary according to the type of commodity and occur only at the port.

The fourth part of Table 4-1 shows marketing costs (MKT), which are the sum of transportation costs from the farm to the port, taxes and stamps, grain drying, grain separation, and storage commissions. This cost varies depending on the yield (quantity) obtained and is calculated as in equation [4-4].

$$MKT = m * FAS * Q \qquad [4\text{-}4]$$

where "m" is a percentage that represents the sum of all the costs involved in bringing commodities from the farm to the port. It typically ranges between 10% and 30% of FAS price and differs across commodities. Marketing costs are then calculated by multiplying m by the FAS price and by the quantity (Q) being transported to port.

Based on the variables in the budget sheets (such as Table 4-1), net revenue (NRev) is calculated by subtracting the marketing cost from the gross revenue (GR) and expressed in US$/Ha NRev = GR – MKT [4-5].

$$NRev = GR – MKT \qquad [4\text{-}5]$$

Next, the gross margin (GM) is calculated by subtracting direct costs (DC equation DC = Till + CH + F + S [4-1) from net revenue (NRev) as in equation GM = NRev – DC [4-6, and expressed in US$/Ha. GM is the economic result of the productive activities of the firm, taking into account revenues generated by the firm activities and the costs directly related to those activities. It does not include indirect or overhead costs.

$$GM = NRev – DC \qquad [4\text{-}6]$$

At this point it is possible to compute the interest on capital and express the gross margin net of capital costs (GMai), which is calculated by subtracting direct cost and interest on direct cost, DC(1+i), from net revenue (equation [4-7).

$$GMai = NRev – DC * (1 + i) \qquad [4\text{-}7]$$

The data obtained from the budget sheets allow us to calculate the Gross Margin per hectare, per crop, per year, per region. This result is used for management decisions by famers and helps them decide which crop to sow, but it does not represent the farmer´s final profits. For that it is necessary to subtract first the interest paid on loans to finance the direct costs (as in equation 4-7) and, secondly, the indirect cost. In our analysis we use as reference the annual average of interest rate of the Central Bank of Argentina for Time deposits (From 60 day term and more) in dollars for the interest rate (i) in equation 4-7. From 1985 to 1992, the interest rate was 5% and from 1993 to the present the source was the BCRA web page, section Statistics. To this value we subtracted the indirect cost in order to get the net returns. The Indirect Cost or Overhead cost is a difficult variable to generalize given the multiplicity of management and the scale of the firms. It represents the fixed cost that the firm would incur regardless of the amount of acreage in production. For this purpose we obtained data from the Ministry of Agriculture, Cattle and Fisheries of Argentina which calculated the Overhead cost for the main crops, from 1985 to 2001. After the 2001 economic crisis and the devaluation of Argentine currency we used from 2002 to the present data from the Magazine Margenes Agropecuarios as reference for the Indirect Cost for each region. These costs include the following items: field operations mobility, management mobility, field personal labor cost, management personal and contractors labor cost, legal and accounting fees, office and communication expenses, county level taxes, real estate tax, Bank Account transaction costs, Property tax, and miscellaneous in dollars per hectare for exclusively agricultural exploitations.

In Argentina all debit and credit movements in bank accounts are taxed (1.2% in total). The Gross Revenue regardless of being accredited in parts at different moments of the year will always pay this 0.6% tax (). The debits made for covering the production cost during the seven months also pay a 0.6% tax. For this paper we assume that the whole amount of Gross Revenue will be accredited and debited one time, from which the Government will tax in total 1.2%. The firms also pay an Income return Tax of 35%. This tax is applied to the Net Returns. The percentage applied differs depending on the legal type of firm chosen. For this analysis we assume that all firms are under private ownership and pay a 35% tax on the net returns.

Subtracting indirect costs (IC) the gross margin net of interest t (GMai), gives the farmers' net return (NRet), which is also called operational result or agricultural rent (equation $NRet = GMai - IC$ [4-8). It is expressed in US$/Ha.

$$\text{NRet} = \text{GMai} - \text{IC} \qquad [4\text{-}8]$$

Finally, farmers' profit (π) is calculated by subtracting income tax (IT) from net return (NRet) as in equation $\pi = \text{NRet} - \text{IT}$ [4-9.

IT represents the 35% tax on the (positive) net return that the firm (farmer) has to pay to the federal government.

$$\pi = \text{NRet} - \text{IT} \qquad [4\text{-}9]$$

Farmers' profit (π) are expressed in US$/Ha and represent farmers' total revenue minus their total costs. Equations DC = Till + CH + F + S

[4-1 through $\pi = \text{NRet} - \text{IT}$ [4-9

explain in detail how each component of revenue and cost are calculated from the data set, but they are essentially calculating profit as the difference between revenues generated by the farming operation and all the costs involved in the operation.

4.1. Research geographical scope

The data obtained allows us to construct time series of the profits for different regions, and for different crops. We use quarterly data (February, May, August and November) from 1985 to 2014 for the following regions: South Entre Ríos, South Santa Fe, North Buenos Aires, Southeast Buenos Aires, Southwest Buenos Aires, West Buenos Aires, South Southeast Cordoba, Salta, Santiago del Estero, East La Pampa, and Centre-West Buenos Aires. Based on a survey conducted by the Buenos Aires Board of Trade, these regions represent a diverse group of crop areas in terms of crops grown, technology level, agronomical conditions, and geographical location. Table 4-2 shows the break down data set according to region, commodity and data availability.

Table 4-2: Data series collected from Margenes Agropecuarios from each region and each crop.

Region	Crop			
	Corn	Wheat	Soybeans	Sunflower
South Entre Ríos	2000/2014	2012/2014	2006/2014	
South Santa Fe	1985/2014	2000/2014	1985/2014	
North Buenos Aires	1985/2014	2000/2014	1985/2014	
Southeast Buenos Aires	2000/2014	1985/2014	2000/2014	2000/2014
Southwest Buenos Aires	2000/2014	2000/2014	2006/2014	2000/2014
West Buenos Aires		2000/2014	2000/2014	1985/2014
South Southeast Cordoba	2000/2014	2000/2014	2006/2014	2000/2014
Salta			2006/2014	
Santiago del Estero			2006/2014	
East La Pampa		2012/2014		2000/2014

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Chapter 5 - Methodology and research plan

Since we are interested in analyzing the risk faced by farmers in terms of the variable profit (π), it is necessary to present the model we are using to measure it (Halle, n.d.; Guida Daza, 2009) and explain the research method used to analyze these data and then discuss the results.

5.1. Framework and Model approximation

As explained in chapter 4, profit is equal to total revenue minus all of the various costs associated with the production and marketing of agricultural commodities.

Now, you can leave out all of the material you have here because it simply repeats what you did in chapter 4

π is calculated from the data set as:

$$\pi = GR - MKT - DC\,(1+i) - IC - IT \qquad [5\text{-}1]$$

The FAS price in US$/TN is the price the farmers receive for their marketed crops. Since we only have FAS prices, we use them to calculate FOB prices. This operation differs slightly with the one performed at the actual markets, but it is sufficiently accurate for our purpose in this thesis.

Recalling that:

FAS price = FOB price – export tax – fix export cost – commercialization cost

The export tax is charged as a percentage of the FOB price, while commercialization cost can be expressed as a percentage of the FAS price. Therefore, can be written as:

$$FOB*(1 - t_{export}) = FAS\ (1 + t_{fobbing}) \qquad [5\text{-}2]$$

Hence, $$FOB = \frac{FAS \cdot (1 + t_{fobbing})}{1 + t_{export}} \qquad [5\text{-}3]$$

where $t_{fobbing}$ is the commercialization cost expressed in percentage (also called fobbing cost or variable exporting cost) at the Argentine ports, and t_{export} is the percentage export tax applied by the Argentine custom authorities. In this research $t_{fobbing}$ is based on 2014 values (wheat is 4.51 %, corn is 3.47%, soybeans is 3.33% and sunflower is 15.19 %, as informed by BCR). In contrast, values for t_{export} are based on the values that were applied by the Federal government in each quarter of each year from 1985 to the present.

Following is a description of the rest of the variables included in our framework profit function model. In order to get the profit we need to include the indirect cost (IC) also called overhead cost. It is the sum of the fixed expenses that the firm will incur even if no production process is being held. The management cost and the bank account transaction (1.2%) cost are included. The management cost is the retribution paid to those who manage the firm or to the family members who supported the firm's activities with their own labor.

5.1.1. Profit (π) function

Equation [[5-4] can be further decomposed into more detailed components. To calculate the profits we take into account the Income Tax (IT) that the firm has to pay to the Federal government. We consider a coefficient of 0.35 of positive NRet for the IT. The expression is in US$/Ha. The π

[5-4] and subsequently

[5-5] are as follow:

$$\pi = GR - TC \qquad [5\text{-}4]$$

$$\pi = NRet - IT \qquad [5\text{-}5]$$

Where, TC is total cost including IT, and GR is Gross Revenue.

We have to make a distinction between Gross Margin analysis and Profitability analysis in order to explain the Budget sheet variables we use as data sources. The Gross margin analysis allows the farmers to choose among the different productive activities that the firm could potentially undergo by looking at the difference between the Gross Revenues and the Direct Cost generated by the activity and allows the manager to analyze the profile of those costs. On the other hand, the profitability analysis gives the manager the final result of the firm, given that all types of cost are included along with all the activities. For that it is necessary to apply a criterion on the weight of overhead cost that each activity will bear.

5.2. Research method

We will analyze how different export tax schemes affect the probability distribution of farmers' profits, particularly their expected profit and risk. Based on a parametric model for profits, Monte Carlo simulations will be used to generate probability distributions for farmers' profits in each region for each crop. A stochastic analysis using endogenous random variables (RV) from the parametric model will then be carried out. Monte Carlo simulation is a technique that takes randomly generated inputs (random variable values) with a particular probability distribution to simulate the process of sampling. In each iteration of the simulation, random values of inputs are combined in the parametric model to generate a value for the output. After a large number of iterations, there will be a large number of output values, which can be represented and analyzed as histograms, probability density functions, cumulative density functions, Q-Q Plots, error bars, reliability predictions or confidence intervals ("Agriculture Risk Analysis Estimator," 2012). This method is used, for example, for sensitivity analysis or for comparing the probability of returns in different investment projects.

The first step is to specify the parametric model for farmers' profit. As previously discussed, profits are given by the difference between gross revenue and costs, as in equation$\pi = (Q * Pr) - MKT - DC - IC - IT$ [5-6]:

$$\pi = (Q * Pr) - MKT - DC - IC - IT \qquad [5\text{-}6]$$

Where all the variables have been defined earlier. Here m (used to calculate MKT) is also a random variable, and the distribution was constructed from quarterly data and the range varies depending the crop (i.e. for wheat it ranges from 0.094 to 0.481) Therefore, MKT is simulated based on the values of Q and Pr. Similarly, IT is also simulated based on values of the other variables. The income tax rate in Argentina is 35%, hence IT is calculated as a proportion of net return (NRet), which is given by NRet = Q * Pr – (m * Pr * Q) – DC – IC. Therefore, IT is 35% of NRet calculated from the simulated values of the other variables.

Three models will be simulated. Model (a) considers the current fixed-rate export tax, such that Pr = FAS price with a fixed-rate export tax. Model (b) considers the scenario without any export tax, then Pr = FAS price without applying the export tax. Model (c) assumes a variable-rate export tax such that Pr = FAS price with export tax determined by the proposed mobile scale.

Before starting the simulation, we first need to determine the type of probability distribution that the random variables Q, Pr, DC and IC follow. The variables Q and Pr are assumed to be independent, because quantities produced by individual farmers in Argentina cannot affect the international price. EASYFIT 5.6 Professional statistic software is adopted to fit 61 types of distributions onto historical data for each variable in equation 3-10. Then Kolmogorov-Smirnov and the Anderson-Darling tests are used to check for the best fit. For each variable in equation$\pi = (Q * Pr) - MKT - DC - IC - IT$ [5-6], the best-fitted distribution with its corresponding parameters is adopted to run the simulations.

As the simulation starts, a value from a uniform distribution U~ (0, 1) is randomly generated and plugged into the inverse cumulative distribution function (CDF) of each random variable, which then returns the corresponding value for that variable. For example, the value 0.79 is randomly generated from U~ (0, 1) and taken as F(x) in the inverse CDF of the variable indirect cost. Then the inverse CDF returns the value of indirect cost associated with F(x) = 0.79. This procedure is repeated for each variable and, at the end of each iteration, it is possible to calculate the profit from the simulated values of each variable. In total, 5,000 iterations are performed for each model, yielding 5,000 values for profit for each model.

Even though using the distribution that more accurately represents the variable is a more sound method to run a simulation (Ramirez, Misra, & Field, 1999; Hennessy, 2009), it is common practice to simply assume that random variables follow a normal distribution for simplicity. A further point that is also explored in this thesis is how relevant are the differences in results when the simulation is run with the best-fitted distributions for each variable and when it is run assuming that all variables are normally distributed (in which case sample means and standard deviations are used to generate each variable's normal distributions).

In sum, three models will be simulated for each commodity (no export tax, fixed-rate export tax and variable-rate export tax) with two sets of probability distributions (best-fitted and normal) for different regions, totaling 168 simulations, each one with 5,000 iterations (see Table 5-1).

Table 5-1. Number of Monte Carlo Simulations across crops, regions, models and type of distributions.

Crop	Regions	Models (a)	Type of Distributions (b)	# of simulations
Soybeans	9	3	2	54
Corn	7	3	2	42
Sunflower	5	3	2	30
Wheat	7	3	2	42
			Total	168

(a) No export tax, fixed-rate export tax, and variable-rate export tax; (b) one simulation with the best-fitted distributions for each variable, and the other assuming normal distributions for all variables.

Once the simulations are run and values for farmers' profits are generated, we are primarily interested in how the three export tax policies affect farmer's profits and risk. The principal building block of risk analysis is the probability distribution of returns (in our case, profits). The expected profit (E (π)) is equal to the sum of the possible individual profits times their respective probabilities as in [5-7].

$$E(\pi) = p_1\pi_1 + p_2\pi_2 + \cdots + p_n\pi_n = \sum_{i=1}^{n} p_i\pi_i \qquad [5\text{-}7]$$

where E(π) is the expected profit and π_i represents the specific profit outcome with probability p_i.

The variance is a measure of dispersion of the probability distribution and is traditionally used as a measure of risk. The variance is calculated by squaring the deviation of each occurrence (profit sampling unit) from the mean and multiplying each value by its associated probability and summing across these values. The square root of the variance is the standard deviation and is defined as in [5-8]

$$SD = \sqrt{p_1[\pi_1 - E(\pi)]^2 + p_2[\pi_2 - E(\pi)]^2 + + p_n[\pi_n - E(\pi)]^2} = \qquad [5\text{-}8]$$

$$\sqrt{\sum_{i=1}^{n} p_n[\pi_n - E(\pi)]^2}$$

The left panel of Figure 5-1 illustrates this idea. Three distributions have the same mean but different standard deviations, meaning that they have the same expected profit but different degrees of dispersion around that value. The distribution with higher standard deviation (dispersion) would be riskier because there would be greater likelihood of an occurrence farther from the expected profit. This measure of risk has weaknesses to be considered. In the calculation of the standard deviation, the deviations above and below the expected profit are given weights equal to their respective probability of occurring. In our case the farmers and agri-food firms are interested in the variable profit and are more concerned with negative deviations and not with positive deviations (Warwick, 2003). In

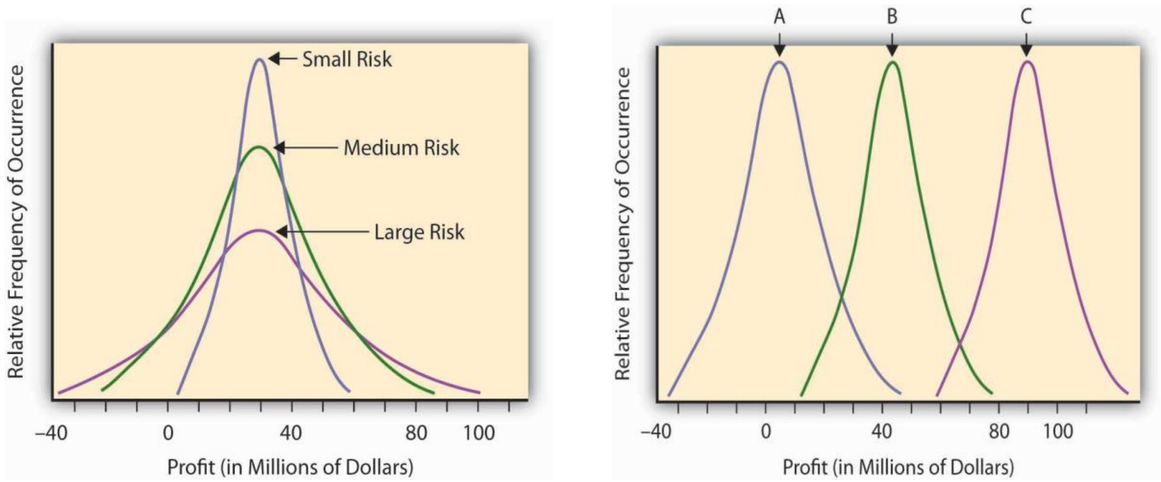


Figure 5-1. Standard Deviation and Risk. Source: Baranoff et al, 2012.

other words, firms and investors see the part of the distribution below the mean, or even below zero (i.e. negative profits), as riskier.

One dimension of this problem is that two distributions can have different means but the same standard deviation. This raises two issues. First, distributions with larger means tend to have larger standard deviations, i.e. a larger standard deviation may be caused simply by a larger mean. In this case, a larger standard deviation does not necessarily imply greater risk. This first issue can be solved by adopting the coefficient of variation (C.V.) instead of the standard deviation as a measure of dispersion (risk). The C.V. is the ratio of the standard deviation to the mean, i.e. it is a standardized measure of dispersion. Second, distributions with lower means can be seen as riskier than those with higher means, even though they have the same standard deviation. The right panel of Figure 5-1 illustrates this point. Three distributions have the same standard deviation but different expected profits, but the distribution “A” can be considered riskier than the others because it has lower mean or a large part of its area lies below zero, as opposed to the others that have no negative values.

The point behind this second issue is that the standard deviation measures dispersion in the whole distribution, which does not necessarily capture risk. Alternatively, farmers would be interested to know the probability of loss, $P(\pi < 0)$, the expected profit considering only $\pi_i < 0$, the dispersion of profit considering only $\pi_i < 0$,. In other words, they would mostly be interested in the following questions: how likely is it that I will lose money? If I happen to lose money, what is my expected loss and how much can it deviate from this expected value? In this sense, we are defining risk as “losing money”, therefore outcomes below zero are “risk “and outcomes above zero are “profit opportunities”. Actually, profit opportunities can be explored by asking similar questions: how likely is it that I will make money? If I make money, what is my expected gain and how much can it deviate from this expected value? Three values can help answer these questions: the probability of gain, $P(\pi > 0)$, the expected profit considering only $\pi_i > 0$, the dispersion of profit considering $\pi_i > 0$.

Lower Partial moments (LPM) will be used as another risk measure to help answer the above questions about the area of the profit distribution below zero. The term ”partial” indicates that the measure relates to only one side of the distribution relative to a benchmark; while ”lower” reflects that the area of interest is the downside, which in our analysis represents negative profits or losses. The lower partial moment of order n (LPM_n) can be calculated as in equation $LPM_n = E\left(\max(B-\pi,0)^n\right) = \int_{-\infty}^{B} (B-\pi)^n \, dF(\pi)$

[5-9:

$$LPM_n = E\left(\max(B-\pi,0)^n\right) = \int_{-\infty}^{B} (B-\pi)^n \, dF(\pi) \qquad [5\text{-}9]$$

where π is the profit, B is a given benchmark, F(π) is the cumulative probability distribution of profit, and "n" represents the order of the LPM. In this research it is assumed that B = 0, which implies that the lower partial moment will focus only on negative values of the profit distribution. If n= 0, the LPM is equivalent to the probability of shortfall (loss), P(π < 0). If n= 1, the LPM is equal to the expected shortfall (loss) If n=2, the LPM is equal to the dispersion of profits below zero. It is a relatively complete measure in that it uses all values of the shortfall with their associated probabilities. This is more consistent with observed investor behavior in the sense that most investors perceive infrequent but large losses as more risky than more frequent but small losses (Warwick, 2003, page 55)

The upper partial moments (UPM) are conceptually the equivalent of the LPM for the other side of the distribution relative to the benchmark (equation

$UPM_n = E\left(\max(\pi-B,0)^n\right) = \int_{B}^{+\infty} (\pi-B)^n \, dF(\pi)$ [5-10]). In our

research, the UPM_0, UPM_1 and UPM_2 measure, respectively, the probability of gains or positive profits, P(π > 0), the expected gain or positive profit from the upper side of the probability distribution, and the standard deviation of gains from the upper side area of the probability distribution.

$$UPM_n = E\left(\max(\pi-B,0)^n\right) = \int_{B}^{+\infty} (\pi-B)^n \, dF(\pi) \qquad [5\text{-}10]$$

Finally, two other statistics will also be used in the discussion of the simulation results, the ratios UPM_1/LPM_1 and UPM_2/LPM_2. The first one shows the ratio between the "expected gain" and "expected loss". If this ratio is greater (less) than 1, it indicates that "expected gain" is proportionally larger (smaller) than "expected loss", suggesting an asymmetric distribution favorable to positive (negative) profits. The second one shows the ratio between upside dispersion and downside dispersion. If this ratio is greater (less) than 1, it indicates that upside variability is proportionally larger (smaller) than downside variability.

Chapter 6 - Results and Discussion

Given the amount of data we will compare and analyze the results in the following way:

- Same Commodity, across regions and across simulation models.
- Same Commodity comparing simulations run with fitted distributions and with the Normality assumption.

6.1. Same Commodity, across regions and across simulation models

6.1.1. Corn

A general summary of results is presented in

Table 6-1 for the case of corn across all the regions where this crop is analyzed. The results compare a series of statistics for the three models of export taxes studied in this research.

In the model with fixed-rate export taxes, the overall mean profit is positive only for North Buenos Aires region (32.92.00 US$/Ha), while the other regions have negative values that range from -366.24 US$/Ha in South Southeast Cordoba to -25.46 US$/Ha in South Entre Rios. It is interesting to note the variety of results for overall dispersion (C.V.) in the distributions, ranging from 0.4 for South Southeast Cordoba to – 6.85 and 9.33 for North Buenos Aires and South Entre Rios, respectively (all in absolute values). The probability of loss (LPM_0) is generally greater than the probability of gain (UPM_0), indicating more mass of the distribution is concentrated on the downside area (except for North Buenos Aires). With respect to the partial moments of orders 1 and 2, LPM_1 is greater than UPM_1 and LPM_2 is greater than UPM_2 across all regions (except North Buenos Aires), suggesting the distributions are skewed towards negative values.

Table 6-1: General Results for Corn across Regions and models

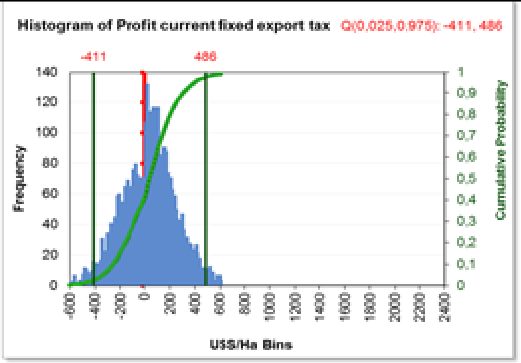
Corn across Regions General Results			
Model	Fixed-rate Export Tax	No export tax	Variable-rate export Tax
E(π)	All < 0 (Except N BSAS)	All > 0 (Except S SE Cordoba)	Mixed
C.V.	Higher for N BSAS and S Entre Rios	Higher for S Santa Fe	Mixed Higher for S Santa Fe > than without export tax
P(π)	$P(\pi>0) < P(\pi<0)$ (Except N BSAS and S Entre Rios)	$P(\pi>0) > P(\pi<0)$ (Except S SE Cordoba)	$P(\pi>0)$ > than fixed-rate export tax $P(\pi<0)$ lower than fixed-rate export tax
UPM_1/LPM_1	All < 1 (Except N BSAS)	All > 1 (Except S SE Cordoba)	Mixed
UPM_2/LPM_2	All < 1 (Except N BSAS)	All > 1 (Except S SE Cordoba)	Mixed

In the model without export taxes, results show a different picture. Expected profits are greater than in the case of fixed-rate export tax for all regions (as expected) and, except for SE Cordoba, are also positive. Conclusions about the overall dispersion of the probability distribution compared to the model with fixed-rate export tax are mixed. In some regions the C.V. in the no-tax model is greater than in the model with fixed-rate tax, while in other regions the opposite is observed. The probability of shortfall (LPM_0) is generally smaller than the probability of gain (UPM_0), except for SE Cordoba. Similarly, UPM_1 is now greater than LPM_1 and UPM_2 is greater than LPM_2 across all regions (except SE Cordoba), indicating that the removal of export taxes makes the distributions skewed towards positive values.

Table 6-2: Simulated Summary Statistics for all regions and Histograms for Corn in North Buenos Aires in US$/Ha

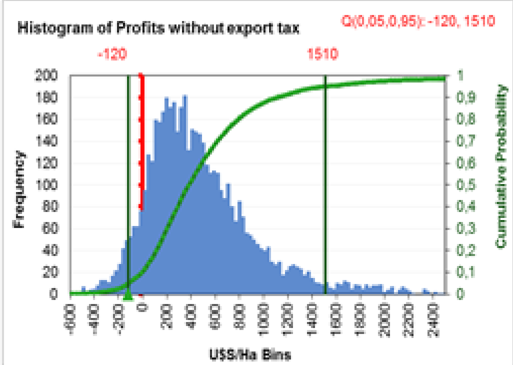
Corn with Current Export Taxes

Statistics		N B SA $	$ Santa Fe	$ SE Cordoba	$ Entre Rios	SE B SA $	SW B SA $	W B SA $
Overall	E(x)	32,92	-133,80	-366,24	-25,46	-149,07	-41,69	-147,77
	St.Dev = σ	225,46	348,70	147,67	237,61	219,28	226,76	271,59
	C.V = σ/E(x)	6,85	-2,61	-0,40	-9,33	-1,47	-5,44	-1,84
LPMs	LPM0	0,40	0,76	0,99	0,50	0,74	0,57	0,68
	LPM1	-72,79	-180,93	-366,98	-101,92	-182,43	-111,14	-190,39
	LPM2	142,71	280,05	394,79	193,51	248,69	178,18	291,86
UPMs	UPM0	0,60	0,237	0,01	0,50	0,26	0,43	0,32
	UPM1	105,71	47,13	0,74	76,46	33,35	69,45	42,62
	UPM2	177,62	247,11	9,09	140,22	91,96	146,32	102,05
Upper / Lower Comparison	UPM1/LPM1	1,45	0,26	0,002	0,75	0,18	0,62	0,22
	UPM2/LPM2	1,24	0,88	0,02	0,72	0,37	0,82	0,35



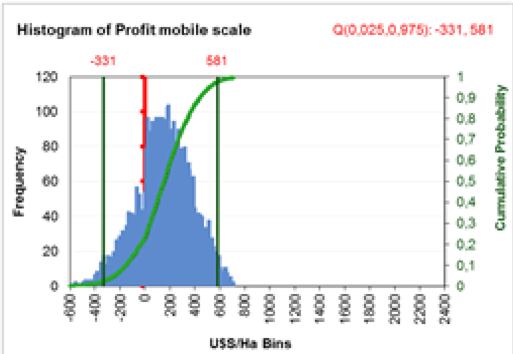
Corn without Export Taxes

Statistics		N B SA $	$ Santa Fe	$ SE Cordoba	$ Entre Rios	SE B SA $	SW B SA $	W B SA $
Overall	E(x)	512,92	182,53	-157,82	353,06	243,67	385,15	294,77
	St.Dev = σ	644,66	710,07	271,42	521,96	224,38	638,09	547,50
	C.V = σ/E(x)	1,26	3,89	-1,72	1,48	2,27	1,66	1,86
LPMs	LPM0	0,10	0,34	0,76	0,18	0,28	0,18	0,24
	LPM1	-15,18	-70,19	-204,01	-31,99	-52,27	-28,60	-58,13
	LPM2	64,19	188,00	266,95	116,09	122,27	83,99	156,32
UPMs	UPM0	0,90	0,66	0,24	0,82	0,72	0,82	0,76
	UPM1	528,10	252,72	46,19	385,06	295,94	413,75	352,89
	UPM2	821,31	708,65	165,26	619,37	591,44	740,57	601,84
Upper / Lower Comparison	UPM1/LPM1	34,79	3,60	0,226	12,03	5,66	14,47	6,07
	UPM2/LPM2	12,79	3,77	0,62	5,34	4,84	8,82	3,85



Corn with Mobile Scale Export Taxes

Statistics		N B SA $	$ Santa Fe	$ SE Cordoba	$ Entre Rios	SE B SA $	SW B SA $	W B SA $
Overall	E(x)	149,95	-21,98	-314,73	112,27	-43,43	62,84	-29,21
	St.Dev = σ	230,18	400,41	153,93	243,09	224,38	235,44	275,18
	C.V = σ/E(x)	1,54	-18,21	-0,49	2,17	-5,17	3,75	-9,42
LPMs	LPM0	0,23	0,57	0,97	0,27	0,55	0,38	0,47
	LPM1	-36,73	-111,64	-316,07	-49,02	-111,99	-63,74	-120,04
	LPM2	99,34	223,40	350,17	139,93	184,98	128,77	229,18
UPMs	UPM0	0,77	0,43	0,03	0,73	0,45	0,62	0,53
	UPM1	186,68	89,66	1,34	161,29	68,57	126,58	90,83
	UPM2	256,12	333,02	11,38	228,29	134,23	206,88	155,08
Upper / Lower Comparison	UPM1/LPM1	5,08	0,80	0,004	3,29	0,61	1,99	0,76
	UPM2/LPM2	2,58	1,49	0,03	1,63	0,73	1,61	0,68



As an example, Table 6-2 shows histograms for the distribution of simulated profits (in dollars per hectare) in North Buenos Aires Region. The probability density function for the model without export tax exhibits a large upper tail with values that reach 2,400.00 US$/Ha, and with only 10% probability of shortfall (see Appendix 10.1 for all the other simulation results for all regions). On the other hand, the model with the fixed-rate export tax has a much shorter upper tail, barely reaching 700 US$/Ha, while its probability of shortfall is 40%. Note that probability distributions in both models show a similar negative range. The main difference when the export tax is removed is that the mass of the distribution shifts to the right and the range of positive values extends further. A t–test for pairwise mean comparison was set to test the hypothesis that the means of the models with fixed-rate export tax and without export taxes were equal. Test results allow rejecting the null hypothesis at a 5% significance level, meaning the expected overall means are significantly different (see Appendix 10.5 for al tests).

Finally, when looking at the statistics for the model with variable-rate export tax, the general findings lie between the results from the previous models. Expected profits are positive in three regions and negative in four regions, and they are greater than in the model with fixed-rate export tax (but still smaller compared to the model without export tax). Gains are more likely than losses in four regions (probability of gains > probability of losses), and the probability of loss is smaller than in the model with fixed-rate tax (but still greater than in the no-tax model). The importance of these results is that they indicate that the variable-rate export tax decreases the probability of losses by withholding a relatively lower percentage of the full price when it falls within the lower ranges of the scale. Meanwhile, it also increases the opportunity of gains faced by farmers when the price falls within the upper ranges of the price scale by increasing the variability of positive profits along with the expected means. It is important to point out that the farmers and agricultural firms should be more focused on the downside risk than with the upside potential if they follow a typical risk-averse behavior (Mishra & Rahman, 2002). In contrast, the model with the fixed-rate export tax withheld the same percentage regardless the price level, affecting the profits heavily when prices are low and augmenting the probability of shortfall and downside risk. Taking a closer look at all regions, we can point out that the profit probability distributions can exhibit differences across regions. In the model with fixed-rate export taxes, the region with the highest probability of positive profits (highest UPM_0) is North Buenos Aires, followed by South Entre Rios, South West Buenos Aires, West Buenos Aires, South East Buenos Aires and South Santa Fe (Table 6-2). In the remaining region, South Southeast Cordoba, the probability of gain is only 1% and the expected profit is -366.24 US$/Ha. Further, LPM_1 and LPM_2 are quite larger than UPM_1 and UPM_2, respectively. The model with variable-rate tax does not show much change in the results for South Southeast Cordoba. Not even the model without export tax shows much improvement: expected profit is still negative and all lower partial moments are greater than their corresponding upper partial moments. However, this does not necessarily mean that it is not profitable to produce in that region, although it does suggest poor prospects for farmers there. It indicates, though, that export taxes are not the only (and perhaps not even the main) issue affecting farmers' profits. Changes in production and management practices may be needed for the economic viability of farmers in this region.

6.1.2. Soybeans

For soybeans the general results are summarized in Table 6-3. When analyzing Soybeans across regions and for the three models we can observe a mixed situation where some regions show positive overall expected profits while others the opposite. In particular it must be pointed out that Soybeans exhibit in general more probability of positive profits for all regions than corn, except for South Entre Rios in the model with fixed rate export taxes (-78.81.00 US$/Ha compared to -25.46 US$/Ha in corn).

Table 6-3. General Results for Soybeans across Regions and models.

Soybeans across Regions General Results			
Model	Current Fixed Export Tax	Without Export tax	Mobile scale Export Tax
E(π)	Mixed	All > 0	Mixed > than Current Fix export tax
C.V.	All > 0 (Except Salta) Highest for N BSAS	CV decreases (except Salta and Santiago del Estero) Higher decreases for W BSAS	CV without export tax < CV < CV current fix Except SE BSAS and S Entre Rios which are larger
P(π)	Mixed	All P(π>0) > P(π<0)	P(π>0) > than fixed-rate export tax P(π<0) lower than fixed-rate export tax
UPM_1/LPM_1	Mixed Lowest Salta and Santiago del Estero Highest SSE Cordoba	All > 1 High increase for S Santa FE, SSE Cordoba and SW BSAS	Similar than the model with current fix export tax, but higher values
UPM_2/LPM_2	Mixed Lowest Salta Highest S Santa Fe	All > 1 Larger Upper Dispersion Lowest Santiago del Estero	Similar than the model with current fix export tax, but higher values

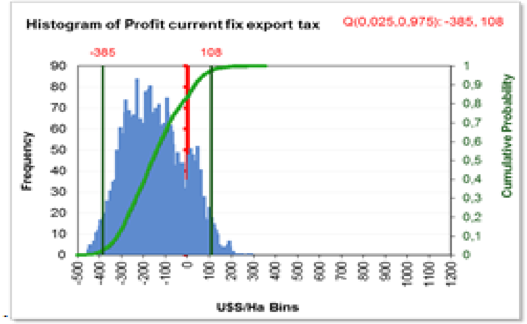
The core regions for the production of soybeans are North Buenos Aires, South Santa Fe and South Southeast Cordoba all of which show positive overall expected profits. The last of these in fact outperforms the other regions when comparing the overall expected profit and standard deviation (Table 6-4), and the overall mean of this region for the three models are significantly different from South Santa Fe region which is the closest in those values (see Appendix 10.5). Southwest Buenos Aires also exhibits positive expected overall profits. The other more marginal regions of Salta and Santiago del Estero show negative overall expected profit values for the model with the fixed rate export tax. These regions are at larger distances from the ports and carry a heavier cost in freight. The expected losses and downside dispersion are larger than any other region. The probability of shortfall for Salta is 84%, LPM_1 is -160.40 US$/Ha, and LPM_2 is 198.74 US$/Ha, with a Coefficient of Variation (CV) of 0.88 US$/Ha. This reflects the overall risk of the marginal areas under the model with the fixed rate export tax. North Buenos Aires region had the highest CV, meaning the variability of profits per unit of profit is larger than in other regions.

The UPM_2 values are lower for Salta and Santiago del Estero (Table 6-4). In general, the regions with positive overall expected profits have larger upper partial moment dispersion. South Southeast Cordoba region has the highest UPM_1 (180.62 US$/Ha) and UPM_2 (269.50 US$/Ha). When comparing the ratio of upper/Lower dispersion (see UPM_2/LPM_2) it stands out Salta with the lowest value and South Santa Fe with the highest.

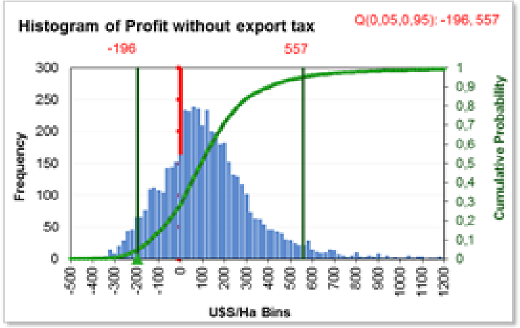
In contrast, in the model without the export tax, all regions exhibit overall positive expected values and lower coefficients of variation, except Salta and Santiago del Estero. This is mainly explained by the higher increases in the first and second UPMs than the increases in the LPMs. The probability of gains (UPM_0) is larger than the probability of losses (LPM_0) for all regions. Without the export tax the marginal areas with adequate agronomic management can achieve sufficient profits, as it was before the export tax was increased several times in the last decade (see results in Appendix 10.4.2). Under this model it seems the UPM_1 and UPM_2 are much larger than the LPMs for all regions, however Santiago del Estero stands out for having the lowest UPM_2/LPM_2 ratio of 4.181 (Table 6-4).

Table 6-4: Simulated Summary Statistics for all regions and Histograms for Soybeans in Salta in US$/Ha

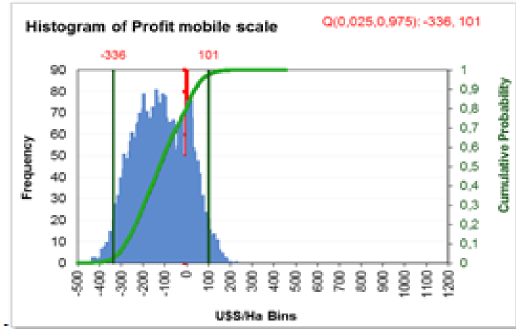
Soy with Current Export Taxes										
Statistics		N BSA $	$ Santa Fe	$ SE Cordoba	$ Entre Rios	SE BSA $	$WBSA $	WBSA $	SALTA	SANTIAGO
Overall distribution	E(x)	68,72	104,47	160,39	-78,81	-84,12	102,06	-28,67	-150,66	-115,20
	St.Dev = σ	175,97	154,00	222,33	147,35	150,71	148,88	165,48	133,29	160,12
	C.V = σ/E(x)	2,56	1,47	1,38	-1,87	-1,79	1,46	-5,77	-0,88	-1,39
LPMs	LPM0	0,32	0,22	0,23	0,68	0,68	0,23	0,53	0,84	0,73
	LPM1	-41,32	-23,23	-20,03	-106,77	-111,27	-17,06	-80,00	-160,40	-137,58
	LPM2	90,97	63,19	50,87	154,38	160,32	43,57	137,34	198,74	188,83
UPMs	UPM0	0,68	0,78	0,77	0,32	0,32	0,77	0,47	0,17	0,27
	UPM1	110,04	127,71	180,62	27,97	27,15	119,12	51,33	9,73	22,38
	UPM2	165,57	175,04	269,50	63,96	63,93	175,16	96,65	31,15	57,01
Upper / Lower Comparison	UPM1/LPM1	2,66	5,50	9,02	0,26	0,24	6,98	0,64	0,06	0,16
	UPM2/LPM2	1,820	2,770	5,298	0,414	0,399	4,020	0,704	0,157	0,302



Soy without Export Taxes										
Statistics		N BSA $	$ Santa Fe	$ SE Cordoba	$ Entre Rios	SE BSA $	$WBSA $	WBSA $	SALTA	SANTIAGO
Overall distribution	E(x)	419,96	492,13	540,27	240,94	188,33	409,39	476,19	130,97	176,26
	St.Dev = σ	377,98	392,87	536,34	343,38	269,96	365,79	479,23	294,91	344,30
	C.V = σ/E(x)	0,90	0,80	0,99	1,43	1,43	0,89	1,01	2,25	1,95
LPMs	LPM0	0,06	0,02	0,03	0,13	0,19	0,02	0,06	0,28	0,24
	LPM1	-5,51	-1,13	-1,21	-15,43	-21,14	-1,04	-6,42	-32,23	-33,97
	LPM2	29,83	11,90	9,70	53,54	62,28	9,58	33,72	74,63	89,97
UPMs	UPM0	0,94	0,99	0,98	0,87	0,81	0,98	0,94	0,72	0,76
	UPM1	425,47	493,26	541,47	256,37	209,47	410,43	482,61	163,20	210,23
	UPM2	564,22	629,60	761,22	416,04	323,21	548,92	674,74	313,93	376,19
Upper / Lower Comparison	UPM1/LPM1	77,25	435,64	448,51	16,62	9,91	395,65	75,15	5,06	6,19
	UPM2/LPM2	18,915	52,901	78,508	7,770	5,190	57,295	20,008	4,207	4,181



Soy with Mobile Scale Export Taxes										
Statistics		N BSA $	$ Santa Fe	$ SE Cordoba	$ Entre Rios	SE BSA $	$WBSA $	WBSA $	SALTA	SANTIAGO
Overall distribution	E(x)	98,18	138,14	184,48	-44,37	-56,29	126,34	35,81	-120,84	-86,10
	St.Dev = σ	156,48	127,10	208,88	128,51	135,46	138,05	157,39	121,23	148,49
	C.V = σ/E(x)	1,59	0,92	1,13	-2,90	-2,41	1,09	4,40	-1,00	-1,72
LPMs	LPM0	0,23	0,12	0,18	0,58	0,62	0,15	0,36	0,80	0,68
	LPM1	-27,39	-10,36	-11,60	-75,39	-85,89	-8,51	-47,25	-130,77	-110,70
	LPM2	71,23	38,83	34,04	121,65	132,71	28,12	99,68	168,64	162,23
UPMs	UPM0	0,77	0,88	0,82	0,42	0,38	0,85	0,64	0,20	0,32
	UPM1	125,58	148,50	196,08	31,02	29,61	134,86	83,06	9,93	24,60
	UPM2	170,45	183,65	276,60	60,70	62,48	185,01	126,95	29,33	56,09
Upper / Lower Comparison	UPM1/LPM1	4,58	14,33	16,91	0,41	0,34	15,84	1,76	0,08	0,22
	UPM2/LPM2	2,393	4,730	8,125	0,499	0,471	6,581	1,274	0,174	0,346



In the model with variable rate export taxes the overall expected profits follow the trend in the model with the fixed rate export tax but with higher values. In particular, the expected profit for West Buenos Aires turns from losses to gains. In general the statistics fall between the other two models and the risk ratios for all regions show that the UPM_1 and UPM_2 increased more than LPM_1 and LPM_2. It stands out that compared with the model with fixed rate export taxes West Buenos Aires region shows overall gains of 35.81 US$/Ha compared with a loss of -28.67 US$/Ha), this difference is significant (see t-test in Table 6-5) where with an α of 0.05 we rejected the null hypothesis of equal sample means for the two models.

Table 6-5. Soybeans West Buenos Aires t-test for two sample means assuming unequal variances

Model	*Profit fixed rate export tax*	*Profit variable rate export tax*
Mean	-28,67121183	35,80969634
Variance	27388,42714	24775,89678
observations	5000	5000
H0	0	
DF	9973	
T statistic	-19,96316316	
P(T<=t) one tail	2,83938E-87	
T critic value (one tail)	1,645006431	
P(T<=t) two tails	5,67875E-87	significantly different
T critic value (two tails)	1,960201882	

This latter region has a long history of dairy production, cattle breeding and wheat cultivation, but at the present the increase in soybean area has taken the best productive plots, in the same way it did in general for other regions.

The more marginal regions of Salta and Santiago del Estero still have expected losses. Most of the mass of the probability distribution in the model with variable rate export taxes is below the benchmark line for Salta (red line at zero in the Histogram to the right of Table 6-4).

6.1.3. Sunflower

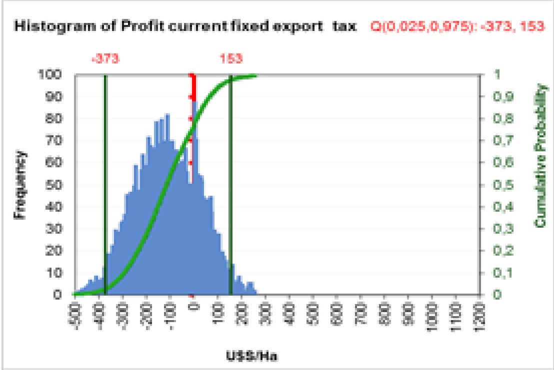
For sunflower the model with the fixed rate export tax shows negative overall returns for East La Pampa (-112.03 US$/Ha), Southeast Buenos Aires (-51.60 US$/Ha) and South Southeast Cordoba (-83.64 US$/Ha). The coefficient of variation is positive for all regions and the highest value is in West Buenos Aires (10.69). The probability of gains larger than probability of losses can be seen only in Southwest Buenos Aires and West Buenos Aires regions (Table 6-6).

Table 6-6. General Results for Sunflower across Regions and models.

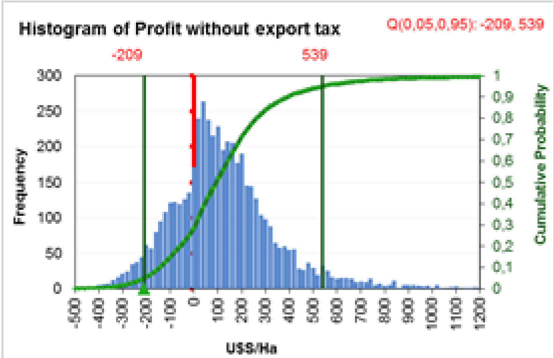
Sunflower across Regions General Results			
Model	Current Fixed Export Tax	Without Export tax	Mobile scale Export Tax
E(π)	Mixend	All > 0	Mixed > than Current Fix export tax
C.V.	All > 0 Highest for W BSAS	Lower than current fix model Except E La Pampa	Mixed
P(π)	P(π>0) < P(π<0) only for SW BSAS and W BSAS	All P(π>0) > P(π<0)	> than Current Fix export tax
UPM_1/LPM_1	Mixed Lowest E La Pampa Highest W BSAS	All > 1 High increase for SE BSAS, W BSAS and SW BSAS	Similar than the model with current fix export tax, but higher values
UPM_2/LPM_2	Mixed Lowest E La Pampa Highest W BSAS	All > 1 Larger Upper Dispersion Highest W BSAS	Similar than the model with current fix export tax, but higher values

Table 6-7: Simulated Summary Statistics for all regions and Histograms for Sunflower in East La Pampa in US$/Ha.

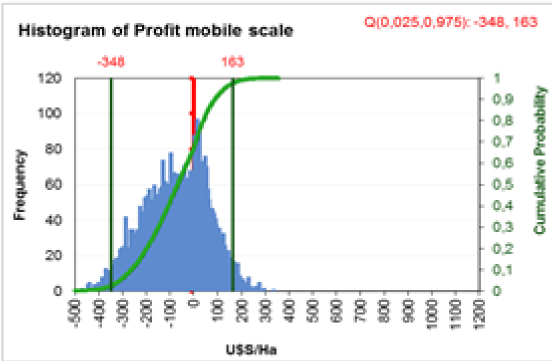
Sunflower with Current Export Taxes						
Statistics		E La Pampa	SE B SAS	SW B SAS	W BSAS	S SE Cordoba
Overall distribution	E(x)	-112,03	-51,60	12,71	57,27	-83,64
	St.Dev = σ	139,69	138,68	135,86	152,73	143,33
	C.V = σ/E(x)	-1,25	-2,69	10,69	2,67	-1,71
LPMs	LPM0	0,76	0,62	0,41	0,32	0,69
	LPM1	-128,83	-84,46	-47,03	-35,13	-108,22
	LPM2	172,99	129,56	90,36	77,67	155,14
UPMs	UPM0	0,24	0,38	0,59	0,68	0,31
	UPM1	16,80	32,87	59,74	92,40	24,57
	UPM2	46,22	71,47	102,25	143,44	58,91
Upper / Lower Comparison	UPM1/LPM1	0,13	0,39	1,27	2,63	0,23
	UPM2/LPM2	0,27	0,55	1,13	1,85	0,38



Sunflower without Export Taxes						
Statistics		E La Pampa	SE B SAS	SW B SAS	W B SAS	S SE Cordoba
Overall distribution	E(x)	121,93	187,04	302,16	358,78	184,59
	St.Dev = σ	258,78	268,29	291,01	345,08	281,71
	C.V = σ/E(x)	2,12	1,43	0,96	0,96	1,53
LPMs	LPM0	0,28	0,18	0,07	0,06	0,20
	LPM1	-34,85	-18,62	-5,59	-5,28	-22,35
	LPM2	82,51	55,43	27,64	28,69	64,20
UPMs	UPM0	0,72	0,82	0,93	0,94	0,80
	UPM1	156,79	205,66	307,75	364,06	206,93
	UPM2	273,91	322,32	418,59	496,97	330,62
Upper/ Lower Comparison	UPM1/LPM1	4,50	11,04	55,07	68,99	9,26
	UPM2/LPM2	3,32	5,81	15,14	17,32	5,15



Sunflower with Mobile Scale Export Taxes						
Statistics		E La Pampa	SE B SAS	SW B SAS	W BSAS	S SE Cordoba
Overall distribution	E(x)	-76,30	-15,65	54,72	97,49	-45,84
	St.Dev = σ	135,46	131,64	119,51	145,56	131,38
	C.V = σ/E(x)	-1,78	-8,41	2,18	1,49	-2,87
LPMs	LPM0	0,67	0,49	0,28	0,22	0,59
	LPM1	-99,24	-60,38	-26,76	-22,02	-77,92
	LPM2	146,69	106,07	63,87	60,11	123,85
UPMs	UPM0	0,33	0,51	0,72	0,78	0,41
	UPM1	22,93	44,73	81,48	119,51	32,09
	UPM2	51,50	79,52	114,88	164,56	63,43
Upper / Lower Comparison	UPM1/LPM1	0,23	0,74	3,05	5,43	0,41
	UPM2/LPM2	0,35	0,75	1,80	2,74	0,51



West Buenos Aires region shows 67.6% probability of gains with the highest upper dispersion (UPM_2 of 143.44 US$/Ha). Remarkably, Southeast Buenos Aires region, which has produced this crop for decades, exhibits more mass on the lower side area of the probability distribution of profits (see Histogram in Appendix 10.1). The ratio of the upper and lower expected profit shows a mixed situation, where the lowest value is for East La Pampa with 0.13, meaning the expected losses are larger than the expected gains. In contrast, the larger value of 2.63 belongs to West Buenos Aires. The variability of losses is higher than the variability of gains (see UPM_2/LPM_2 in Table 6-7) for East La Pampa (with the lowest value), Southeast Buenos Aires and South Southeast Cordoba.

The model without the export tax shows that all regions have higher expected profits per hectare, explained mostly by the increases in the UPMs rather than the LPMs. In general for all regions, the coefficients of variation are lower and the expected gains are larger than the expected losses compared with the fixed rate export tax model. The upper /lower comparisons are all above zero, meaning the weight of the upper first and second moments are larger than the lower side moments, especially the partial expected profits (see upper/Lower comparisons in Table 6-7). In particular it seems this crop has less dispersion in general than corn, soybeans and wheat, exhibiting lower level of risk under the model without export tax.

The model with the variable rate export tax reflects a general increase in profits, but only West Buenos Aires and Southwest Buenos Aires exhibit positive gains. This latter region has the highest coefficient of variation which means more variability per unit of profit. In general, the probability of gains increases relative to the model with fixed rate export tax. Particularly, most of the area under the curve for East La Pampa is below the benchmark at zero profits (67% LPM_0), although not as much as with the fixed rate export tax (76% LPM_0).

The overall profit means of these two models are significantly different as it is reflected in the following Table 6-8.

Table 6-8. Sunflower East La Pampa t-test for two sample means assuming unequal variances.

Model	*Profit fixed rate export tax*	*Profit variable rate export tax*
Mean	-112,0298298	-76,30460276
Variance	19516,07083	18352,05227
Observations	5000	5000
H0	0	
DF	9989	
T statistic	-12,98144716	
P(T<=t) one tail	1,58745E-38	
T critic value (one tail)	1,645006186	
P(T<=t) two tails	3,17489E-38	significantly different
T critic value (two tails)	1,960201501	

As in the case with Soybeans, for Sunflower the variable rate export tax model seems to increase both risk ratios, meaning the variable rate also reduces the risk faced by farmers and increases the profit opportunities compare with the fixed rate export tax model.

6.1.4. Wheat

The model with the fixed rate export tax for wheat exhibit negative overall expected profit values for all regions (see $E(\pi)$ in Table 6-9), a situation of real importance given the fact that this crop has always been a typical representative of the "Pampas plains" for the last century and because is one of the main ingredient in the household food basket given its relatively large weight in the Argentine household price index. East La Pampa and Southeast Buenos Aires regions exhibit low coefficients of variation 0.52 and 0.66 respectively), while the highest value (27.47) is exhibited by Southwest Buenos Aires. In general the probability of loss **(**LPM_0) is larger than the probability of gain (UPM_0) for all regions.

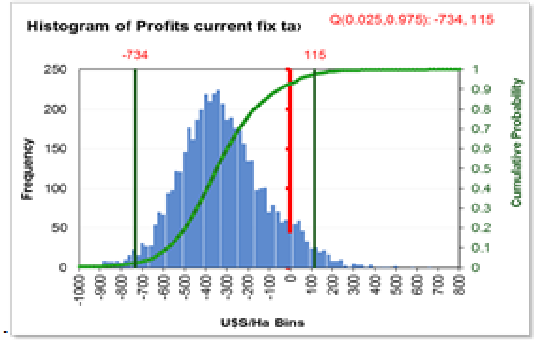
Table 6-9. General Results for Wheat across Regions and models.

Wheat across Regions General Results			
Model	Current Fixed Export Tax	Without Export tax	Mobile scale Export Tax
E(π)	All < 0	All > 0 Except SE BSAS and E La Pampa	> than Current Fix export tax SE BSAS and E La Pampa and SSE Cordoba still with losses
C.V.	Mixed Highest for SW BSAS Lowest E La Pampa	Mixed High increases in SE BSAS and E La Pampa	Mixed Decrease for SW BSAS
P(π)	P(π>0) < P(π<0)	All P(π>0) > P(π<0) Except SE BSAS and E La Pampa	All P(π>0) > P(π<0) Except E La Pampa
UPM_1/LPM_1	All < 1 Lowest E La Pampa Highest N BSAS	All > 1 Except SE BSAS and E La Pampa Highest SW BSAS	Similar than the model with current fix export tax, but higher values
UPM_2/LPM_2	All < 1 Lowest E La Pampa Highest N BSAS	All > 1 Except E La Pampa Highest SW BSAS	Similar than the model with current fix export tax, but higher values

Table 6-10: Simulated Summary Statistics for all regions and Histograms for Wheat in Southeast Buenos Aires in US$/Ha

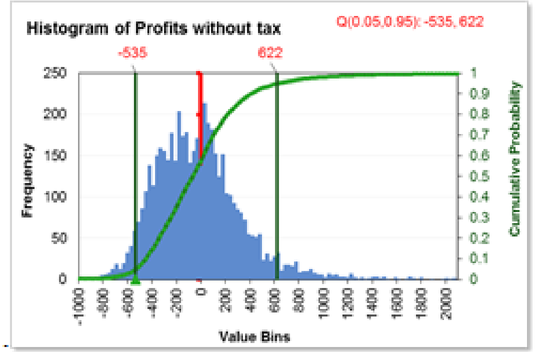
Wheat with Current Export Taxes

Statistics		N BSAS	S Santa Fe	S SE Cordoba	E La Pampa	SE BSAS	SW BSAS	WB SAS
Overall distribution	E(x)	-35,63	-66,32	-102,37	-227,40	-336,69	-5,14	-32,13
	St.Dev = σ	155,47	161,07	244,55	118,17	221,70	140,92	135,43
	C.V = σ/E(x)	-4,36	-2,43	-2,39	-0,52	-0,66	-27,43	-4,22
LPMs	LPM0	0,57	0,68	0,70	0,96	0,93	0,503	0,57
	LPM1	-80,48	-100,27	-126,22	-228,64	-343,80	-57,43	-70,43
	LPM2	130,96	146,34	258,34	236,10	401,27	98,49	115,13
UPMs	UPM0	0,43	0,32	0,30	0,04	0,07	0,497	0,43
	UPM1	44,86	33,94	23,84	1,25	7,10	52,30	38,30
	UPM2	91,04	94,48	59,55	9,32	38,66	100,91	78,22
Upper / Lower Comparison	UPM1/LPM1	0,56	0,34	0,19	0,01	0,02	0,91	0,54
	UPM2/LPM2	0,70	0,65	0,23	0,04	0,10	1,02	0,68



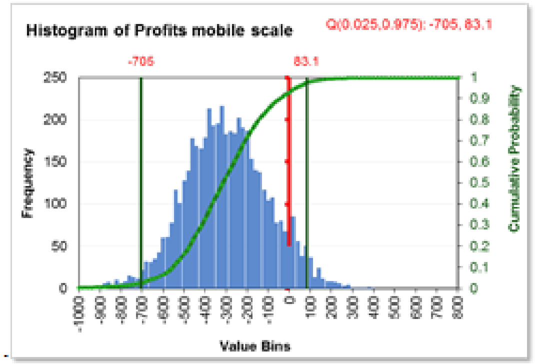
Wheat without Export Taxes

Statistics		N BSAS	S Santa Fe	S SE Cordoba	E La Pampa	SE BSAS	SW BSAS	WB SAS
Overall distribution	E(x)	224,38	173,74	97,36	-48,87	-40,22	227,06	186,73
	St.Dev = σ	325,86	341,44	335,11	213,92	397,87	313,94	280,99
	C.V = σ/E(x)	1,45	1,97	3,44	-4,38	-9,89	1,38	1,50
LPMs	LPM0	0,20	0,24	0,32	0,62	0,57	0,18	0,20
	LPM1	-24,62	-31,25	-59,71	-105,73	-165,70	-18,06	-22,09
	LPM2	69,40	79,30	205,71	159,54	263,35	53,89	62,76
UPMs	UPM0	0,80	0,76	0,68	0,38	0,43	0,82	0,80
	UPM1	249,00	204,99	157,07	56,86	125,47	245,12	208,82
	UPM2	389,50	374,81	281,88	150,65	300,94	383,68	331,49
Upper / Lower Comparison	UPM1/LPM1	10,11	6,56	2,63	0,54	0,76	13,57	9,45
	UPM2/LPM2	5,61	4,73	1,37	0,94	1,14	7,12	5,28



Wheat with Mobile Scale Export Taxes

Statistics		N BSAS	S Santa Fe	S SE Cordoba	E La Pampa	SE BSAS	SW BSAS	WB SAS
Overall distribution	E(x)	65,01	24,51	-26,46	-157,23	-215,53	81,28	50,73
	St.Dev = σ	187,28	198,24	257,72	141,33	264,29	177,75	160,70
	C.V = σ/E(x)	2,88	8,09	-9,74	-0,90	-1,23	2,19	3,17
LPMs	LPM0	0,34	0,43	0,49	0,85	0,78	0,31	0,35
	LPM1	-44,41	-60,40	-88,40	-166,36	-246,36	-33,93	-40,19
	LPM2	96,26	113,09	232,64	209,12	328,59	75,10	85,36
UPMs	UPM0	0,66	0,57	0,51	0,15	0,22	0,69	0,65
	UPM1	109,42	84,91	61,94	9,12	30,83	115,21	90,93
	UPM2	173,31	164,65	114,02	31,06	91,26	180,44	145,30
Upper / Lower Comparison	UPM1/LPM1	2,46	1,41	0,70	0,05	0,13	3,40	2,26
	UPM2/LPM2	1,80	1,46	0,49	0,15	0,28	2,40	1,70



The expected gains (UPM_1) are lower than the expected losses (LPM_1) for all regions (see UPM_1/LPM_1 in Table 6-10). The upper variability is also lower than the downside variability (and UPM_2/LPM_2) for all regions. In particular, East La Pampa region resulted with LPM_0 of 0.96 which means that almost the entire probability distribution of profits fall below zero (Figure 6-1). This region is mostly dedicated to the cattle breeding and the average rainfall is below the requirements for the main crops augmenting the risk faced by farmers who decide to leave acreage to wheat.

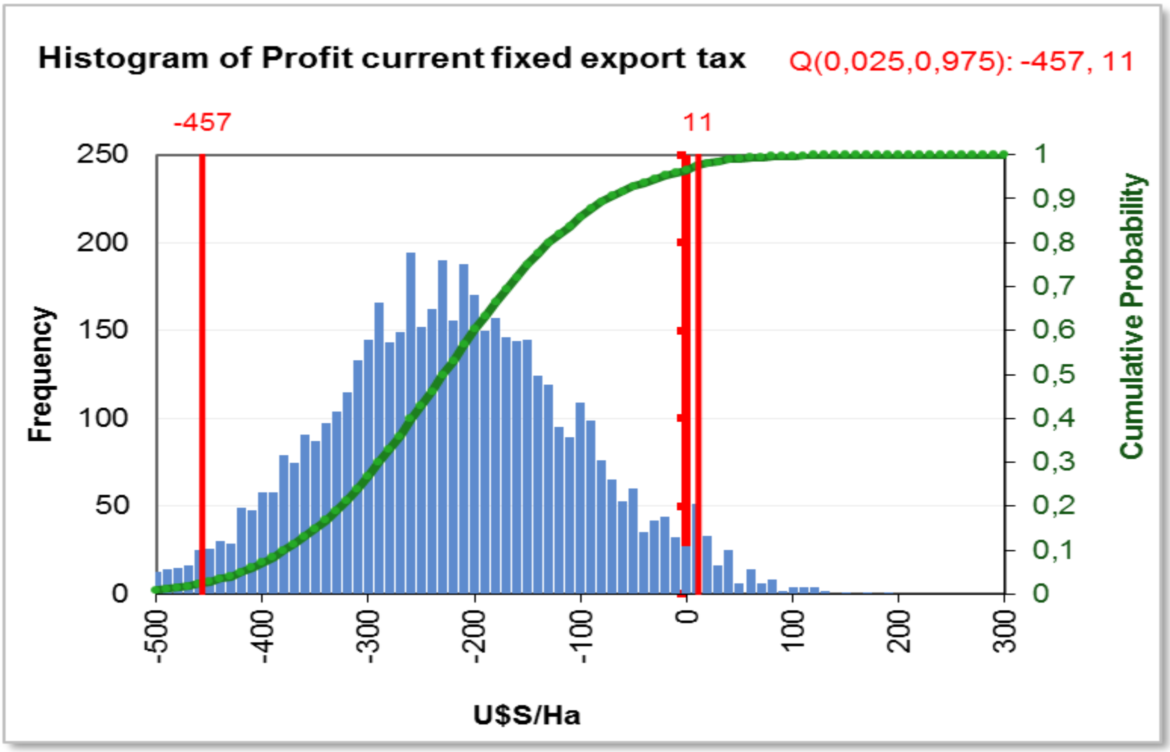


Figure 6-1. Histogram of Profits with current export taxes for East La Pampa. Source: simulation output performed by Vertex 42 Template in Excel.

In the model without the export tax the regions North Buenos Aires, South Santa Fe, South Southeast Cordoba, Southwest Buenos Aires and West Buenos Aires turn to positive overall profits, only remaining East La Pampa and Southeast Buenos Aires with more mass of the probability distribution below the benchmark at zero. For East La Pampa the probability of positive profits increases up to 38% (Table 6-10). This means that this region face high level of risk regardless the taxation. The t test in Table 6-11 shows that there is a significant difference between the expected profit in the fixed-rate export tax model and the variable rate export tax model, with a significance level of 5%.

Table 6-11. Wheat East La Pampa t-test for two sample means assuming unequal variances.

Model	*Profit current fixed rate export tax*	*Profit variable rate export tax*
Mean	-227,3958567	-157,2333818
Variance	13966,58458	19978,73693
observations	5000	5000
H0	0	
DF	9694	
T statistic	-26,92774208	
P(T<=t) one tail	2,1989E-154	
T critic value (one tail)	1,645010829	
P(T<=t) two tails	4,3978E-154	significantly different
T critic value (two tails)	1,96020873	

In fact, the area for wheat has been decreasing and fluctuating since the introduction of the export taxes in Argentina (Figure 6-2). The coefficients of variation show a mixed situation. In particular, high levels of the coefficient of variation in East La Pampa (4.38) and Southeast Buenos Aires (9.89) can be observed in Table 6-10. In general, the probability of gains is larger than the probability of loss except for East La Pampa and Southeast Buenos Aires. The risk ratios show that the upper expected gains (UPM_1) are larger than the expected losses (LPM_1) for all regions (the highest value resulted for Southwest Buenos Aires), except Southeast Buenos Aires and East La Pampa. A similar trend occurs with the upper and lower comparison of variabilities. The upside variabilities are larger than the downside variabilities of the probability distributions of profits for all regions, except for East La Pampa. In this case, the highest value also resulted for Southwest Buenos Aires.

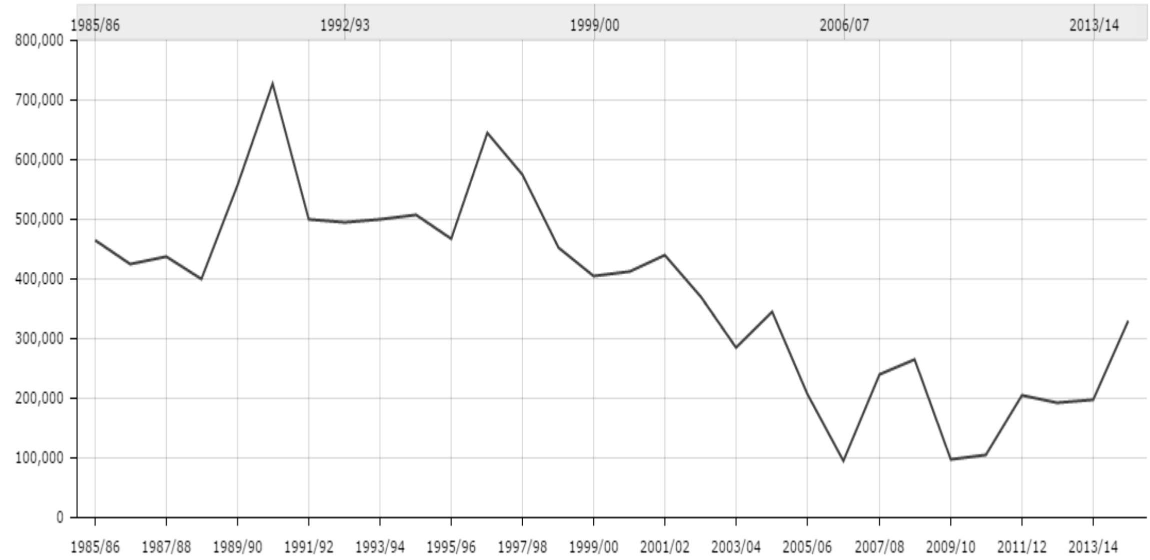


Figure 6-2. Wheat sowing area in East La Pampa (1985/2014). Source: Agriculture Integrated Information system – SIIA, MAGYP.

In the model with variable rate export taxes the expected profits follow the same trend as with the model with the fixed rate export tax but with higher values for all regions. However East La Pampa, South Southeast Cordoba and Southeast Buenos Aires still have losses (negative overall values for profits). There is a mixed situation when looking at the coefficients of variation, but the larger decrease in the value for Southwest Buenos Aires from 27.43 to 2.19 stands out. The probability of gains (UPM_0) is larger than the probability of loss (LPM_0) in all regions, except East La Pampa with 15% probability of gains (Figure 6-3).

Finally, both risk ratios for all regions increases, meaning the expected gains increased more than the expected losses and the upside variability of profits increased more than the downside variability. Therefore, for wheat the model with the variable rate export tax increases the probabilities of profit and decreases the risk faced by farmers.

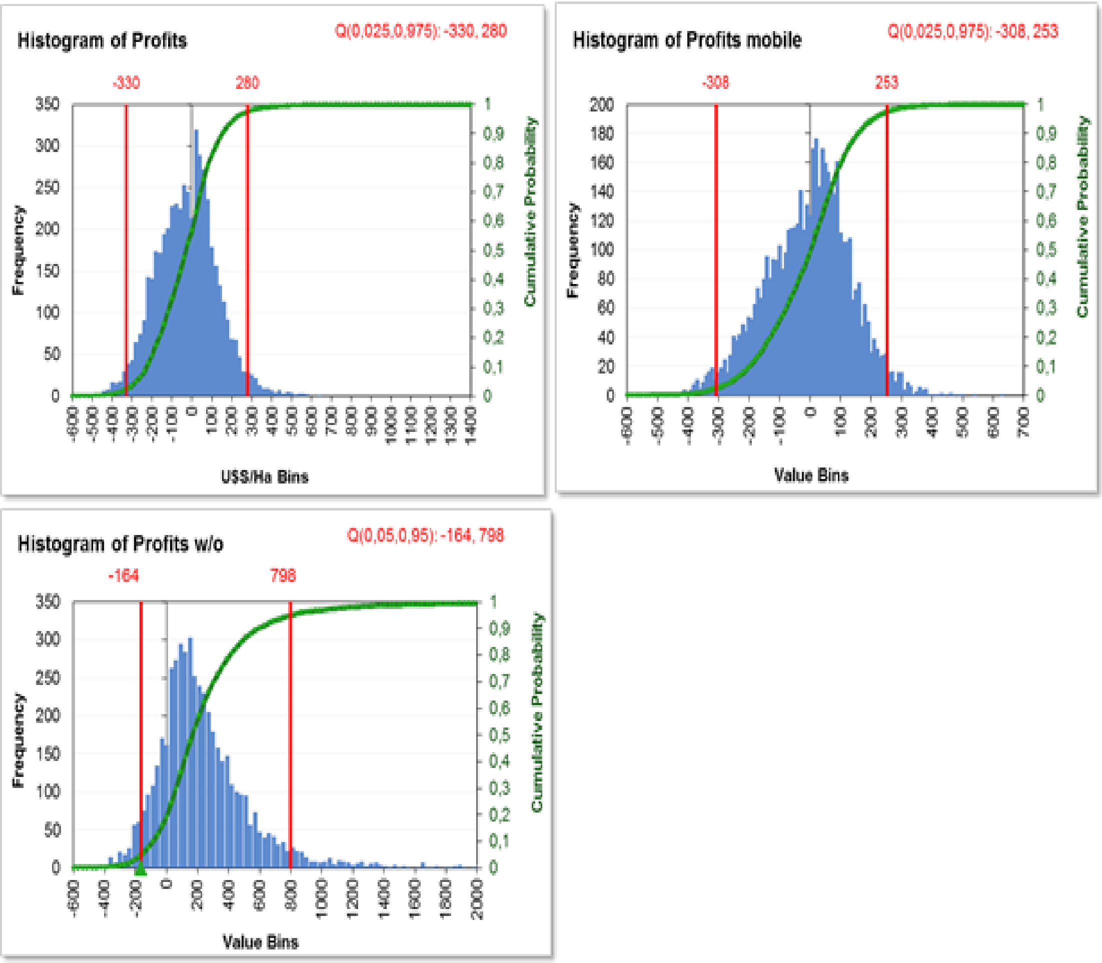


Figure 6-3. Histograms for wheat with current fixed model (upper left corner), mobile scale model (upper right corner) and without export taxes model (left bottom corner) for East La Pampa region.

6.2. Overall results

In general for the four main crops in Argentina and for all regions, the expected profits E(π) in the model with the fixed-rate export tax were lower than in the model with the variable-rate export tax, and both were lower than the model without export tax.

$$E\,(\pi_{\text{Fixed rate}}) < E\,(\pi_{\text{variable rate}}) < E\,(\pi_{\text{no tax}})$$

In general, the probability of loss is larger under the model with fixed-rate export taxes than under the model with variable-rate export taxes, and both models also have larger probability of loss than under the model with no export taxes.

$$LPM_{0\ \text{Fixed rate}} > LPM_{0\ \text{variable rate}} > LPM_{0\ \text{no tax}}$$

The same trend applies to the lower partial moments of orders 1 and 2. The larger expected losses and downside variability correspond to the model with fixed-rate export taxes and the lowest to the model with no export taxes.

$$LPM_{1\ \text{Fixed rate}} < LPM_{1\ \text{variable rate}} < LPM_{1\ \text{no tax}}$$

$$LPM_{2\ \text{Fixed rate}} > LPM_{2\ \text{variable rate}} > LPM_{2\ \text{no tax}}$$

On the upper side of the distributions, the probability of gains (positive profits) is again the largest under the model with no export taxes, which was expected. It is interesting to note that it is larger under the model with variable-rate tax compared to the model with fixed-rate export taxes.

$$UPM_{0\ \text{Fixed rate}} < UPM_{0\ \text{variable rate}} < UPM_{0\ \text{no tax}}$$

The expected gains and upside variability (which reflects upside potential) are larger in general for the model with no export taxes, followed by the model with variable-rate export taxes and the model with the fixed-rate export taxes.

$$UPM1_{\text{Fixed rate}} < UPM1_{\text{variable rate}} < UPM1_{\text{no tax}}$$

$$UPM2_{\text{Fixed rate}} < UPM2_{\text{variable rate}} < UPM2_{\text{no tax}}$$

These overall results suggest that, both in terms of risk and return, farmers in all regions would have been better off under the proposed policy of a variable-rate export tax rather than with the current policy of fixed-rate ad valorem taxes.

6.3. Result comparisons between simulations using fitted distributions and simulations assuming normality of random variables.

6.3.1. Corn

Tre previous results were obtained running the simulation using the random variables with their best-fitted probability distributions. Examples of the most common types of distribution found while fitting different distributions and testing for the best fit with the software Easyfit can be found in Appendix 10.6.

If we run the simulation with the assumption that the endogenous variables behave as Normal N ~ (μ, σ) we obtain quite different results (for all results see Appendix 10.3). In the case of Corn North Buenos Aires the expected profits with current export taxes is larger (37.67 US$/Ha) but this value for the other two models is lower compared with the results when the variables were fitted to their respective distributions The t-test for the model with the variable rate and the model without export tax for equality of means show that there are significant differences when comparing the overall means across their respective simulations with fitted distributions and with the normality assumption (Appendix 10.5Test for significant differences between means and F-Test for variances).

The dispersion increases in the model with the variable rate of export taxes but is lower in the first and third model with the normality assumption.

Table 6-12: Statistics across models for Corn North Buenos Aires

Corn *N BSAS*	Fitted distributions Profits	Profits mobile	Profits w/o	*Normality assumption* Profits	Profits mobile	Profits w/o
E(x)	32,92	149,95	512,92	37,67	137,19	487,27
Stdev	225,46	230,18	644,66	223,88	265,46	492,35
LPM0= Prob(π<0)	0,40	0,23	0,10	0,40	0,25	0,13
LPM1=E(π / π<0)	-72,79	-36,73	-15,18	-71,15	-54,09	-32,16
LPM2= (Var(π / π<0))^0,5	142,71	99,34	64,19	140,37	140,34	114,40
UPM0= Prob(π>0)	0,60	0,77	0,90	0,60	0,75	0,87
UPM1=E(π / π>0)	105,71	186,68	528,10	108,82	191,28	519,44
UPM2= (Var(π / π>0))^0,5	177,62	256,12	821,31	178,43	263,81	683,20
CV = σ/μ	6,85	1,54	1,26	5,94	1,94	1,01
Ratio +E(π)/-E(π) = UPM1/LPM1	-1,45	-5,08	-34,79	-1,53	-3,54	-16,15
Ratio +V(π)/-V(π) = UPM2/LPM2	1,24	2,58	12,79	1,27	1,88	5,97
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,51	-0,37	-0,24	-0,51	-0,39	-0,28
Ratio -E(π)/-V(π) = UPM1/UPM2	0,60	0,73	0,64	0,61	0,73	0,76

The case of Santa Fe is different because with the normality assumption all models show much lower expected profits (-193.43; -130.02 and 73.60 versus -133.80;-21.98 and 182.53 US$/Ha) as can be seen in Table 6-13. In this case the dispersion is much lower with the Normal distributions. The same pattern can be observed for South Entre Rios, Southeast Buenos Aires and Southwest Buenos Aires with the exception that the variability in the model with mobile scale is larger.

Table 6-13: Statistics across models for Corn South Santa Fe.

Corn *S Santa Fe*	Fitted distributions Profits	Profits mobile	Profits w/o	*Normality assumption* Profits	Profits mobile	Profits w/o
E(x)	-133,80	-21,98	182,53	-193,43	-130,02	73,60
Stdev	348,70	400,41	710,07	223,60	257,44	401,64
LPM0= Prob(π<0)	0,76	0,57	0,34	0,79	0,65	0,41
LPM1=E(π / π<0)	-180,93	-111,64	-70,19	-216,86	-178,81	-123,07
LPM2= (Var(π / π<0))^0,5	280,05	223,40	188,00	288,03	268,02	234,38
UPM0= Prob(π>0)	0,24	0,43	0,66	0,21	0,35	0,59
UPM1=E(π / π>0)	47,13	89,66	252,72	23,43	48,80	196,67
UPM2= (Var(π / π>0))^0,5	247,11	333,02	708,65	66,70	106,51	334,36
CV = σ/μ	-2,61	-18,21	3,89	-1,16	-1,98	5,46
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,26	-0,80	-3,60	-0,11	-0,27	-1,60
Ratio +V(π)/-V(π) = UPM2/LPM2	0,88	1,49	3,77	0,23	0,40	1,43
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,65	-0,50	-0,37	-0,75	-0,67	-0,53
Ratio -E(π)/-V(π) = UPM1/UPM2	0,19	0,27	0,36	0,35	0,46	0,59

For the region West Buenos Aires (Table 6-14), in all three models with an assumption of normality the expected overall profits are higher but the dispersion is lower, in contrast with the results described above.

Table 6-14: Statistics across models for Corn West Buenos Aires.

Corn	Fitted distributions			*Normality assumption*		
W BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-147,77	-29,21	294,77	-18,38	75,43	384,21
Stdev	271,59	275,18	547,50	209,71	243,68	433,84
LPM0= Prob(π<0)	0,68	0,47	0,24	0,50	0,31	0,16
LPM1=E(π / π<0)	-190,39	-120,04	-58,13	-92,62	-65,27	-35,51
LPM2= (Var(π / π<0))^0,5	291,86	229,18	156,32	160,87	149,41	115,02
UPM0= Prob(π>0)	0,32	0,53	0,76	0,50	0,69	0,84
UPM1=E(π / π>0)	42,62	90,83	352,89	74,25	140,70	419,72
UPM2= (Var(π / π>0))^0,5	102,05	155,08	601,84	135,78	206,76	567,98
CV = σ/μ	-1,84	-9,42	1,86	-11,41	3,23	1,13
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,22	-0,76	-6,07	-0,80	-2,16	-11,82
Ratio +V(π)/-V(π) = UPM2/LPM2	0,35	0,68	3,85	0,84	1,38	4,94
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,65	-0,52	-0,37	-0,58	-0,44	-0,31
Ratio -E(π)/-V(π) = UPM1/UPM2	0,42	0,59	0,59	0,55	0,68	0,74

So it seems there is not a clear pattern when comparing models run with the two types of distribution. What is clear is that differences in the results arise, and could potentially be of importance if the expected values fall above or below the benchmark (at zero in this paper).

6.3.2. Soybeans

In the case of soybeans the comparisons between models run with the normality assumption or with the best fitted distributions do not show a common pattern across regions. To give an example, for North Buenos Aires the models with variables normally distributed show higher expected value for the model with current fix export taxes and lower dispersion; lower expected profit and higher dispersion in the mobile scale model and almost equal expected profit but lower dispersion in the model without export taxes (Table 6-15).

Table 6-15: Statistics across models for Soybeans North Buenos Aires region.

Soy N BS AS	Fitted distributions Profits	Profits mobile	Profits w/o	Normality Assumption Profits	Profits mobile	Profits w/o
E(x)	68,72	98,18	419,96	75,09	88,92	419,85
Stdev	175,97	156,48	377,98	172,87	178,99	357,34
LPM0= Prob(π<0)	0,32	0,23	0,06	0,29	0,25	0,09
LPM1=E(π / π<0)	-41,32	-27,39	-5,51	-37,31	-36,70	-15,12
LPM2= (Var(π / π<0))^0,5	90,97	71,23	29,83	87,42	96,87	68,54
UPM0= Prob(π>0)	0,68	0,77	0,94	0,71	0,75	0,91
UPM1=E(π / π>0)	110,04	125,58	425,47	112,41	125,62	434,97
UPM2= (Var(π / π>0))^0,5	165,57	170,45	564,22	166,98	174,81	547,06
CV = σ/μ	2,56	1,59	0,90	2,30	2,01	0,85
Ratio +E(π)/-E(π) = UPM1/LPM1	-2,66	-4,58	-77,25	-3,01	-3,42	-28,77
Ratio +V(π)/-V(π) = UPM2/LPM2	1,82	2,39	18,92	1,91	1,80	7,98
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,45	-0,38	-0,18	-0,43	-0,38	-0,22
Ratio -E(π)/-V(π) = UPM1/UPM2	0,66	0,74	0,75	0,67	0,72	0,80

For South Santa Fe the same trend but the expected profit for the model with mobile scale and without export taxes increases.

6.3.3. Sunflower

With the normality assumption the models for Sunflower show the same pattern in all regions. In general the expected overall profits are lower in the three models, but the dispersion does not show a clear pattern, except for the model without export taxes where is always lower (Table 6-16).

Table 6-16: Statistics across models for Sunflower West Buenos Aires region.

Sunflower W BSAS	Fitted distributions Profits	Profits mobile	Profits w/o	Normality Assumption Profits	Profits mobile	Profits w/o
E(x)	57,27	97,49	358,78	18,10	43,92	279,45
Stdev	152,73	145,56	345,08	129,72	146,09	274,62
LPM0= Prob(π<0)	0,32	0,22	0,06	0,39	0,30	0,13
LPM1=E(π / π<0)	-35,13	-22,02	-5,28	-42,96	-39,27	-21,08
LPM2= (Var(π / π<0))^0,5	77,67	60,11	28,69	85,24	94,76	76,29
UPM0= Prob(π>0)	0,68	0,78	0,94	0,61	0,70	0,87
UPM1=E(π / π>0)	92,40	119,51	364,06	61,06	83,19	300,53
UPM2= (Var(π / π>0))^0,5	143,44	164,56	496,97	99,45	119,55	384,31
CV = σ/μ	2,67	1,49	0,96	7,17	3,33	0,98
Ratio +E(π)/-E(π) = UPM1/LPM1	-2,63	-5,43	-68,99	-1,42	-2,12	-14,26
Ratio +V(π)/-V(π) = UPM2/LPM2	1,85	2,74	17,32	1,17	1,26	5,04
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,45	-0,37	-0,18	-0,50	-0,41	-0,28
Ratio -E(π)/-V(π) = UPM1/UPM2	0,64	0,73	0,73	0,61	0,70	0,78

6.3.4. Wheat

For Wheat there is again a no clear pattern when comparing the results of the three models under normality assumption and with the best fitted distributions. In the case of East La Pampa, with the normality assumption, the expected overall profits and dispersion decreases for the three models.

South Southeast Cordoba and Southeast Buenos Aires regions under normality assumption (Table 6-17) show large increases in overall expected profits and decreases in variability under the three models.

Table 6-17: Statistics across models for Wheat Southeast Buenos Aires.

Wheat	Fitted distributions			*Normality Assumption*		
SE BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-336,69	-215,53	-40,22	-13,52	83,07	233,35
Stdev	221,70	264,29	397,87	164,01	216,63	311,13
LPM0= Prob(π<0)	0,93	0,78	0,57	0,49	0,31	0,20
LPM1=E(π / π<0)	-343,80	-246,36	-165,70	-71,64	-51,92	-35,48
LPM2= (Var(π / π<0))^0,5	401,27	328,59	263,35	126,79	118,79	100,86
UPM0= Prob(π>0)	0,07	0,22	0,43	0,51	0,69	0,80
UPM1=E(π / π>0)	7,10	30,83	125,47	58,12	134,99	268,82
UPM2= (Var(π / π>0))^0,5	38,66	91,26	300,94	104,90	199,29	375,60
CV = σ/μ	-0,66	-1,23	-9,89	-12,13	2,61	1,33
Ratio +E(π)/-E(π) = UPM1/LPM1	0,02	0,13	0,76	-0,81	-2,60	-7,58
Ratio +V(π)/-V(π) = UPM2/LPM2	0,10	0,28	1,14	0,83	1,68	3,72
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,86	-0,75	-0,63	-0,57	-0,44	-0,35
Ratio -E(π)/-V(π) = UPM1/UPM2	0,18	0,34	0,42	0,55	0,68	0,72

North Buenos Aires region under normality assumption shows higher expected profits under the three models, and higher dispersion under the fixed rate export tax model and the variable rate export tax model, however lower dispersion for the model without export taxes (Table 6-18). South Santa Fe (see Appendix 10.3.4) shows lower expected value and lower dispersion for the three models.

Table 6-18: Statistics across models for Wheat North Buenos Aires.

Wheat	Fitted distributions			Normality Assumption		
N BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-35,63	65,01	224,38	17,11	105,47	262,71
Stdev	155,47	187,28	325,86	163,15	217,71	306,79
LPM0= Prob(π<0)	0,57	0,34	0,20	0,41	0,27	0,17
LPM1=E(π / π<0)	-80,48	-44,41	-24,62	-56,91	-45,16	-28,26
LPM2= (Var(π / π<0))^0,5	130,96	96,26	69,40	111,02	111,32	89,23
UPM0= Prob(π>0)	0,43	0,66	0,80	0,59	0,73	0,83
UPM1=E(π / π>0)	44,86	109,42	249,00	74,02	150,63	290,97
UPM2= (Var(π / π>0))^0,5	91,04	173,31	389,50	120,77	214,78	393,92
CV = σ/μ	-4,36	2,88	1,45	9,53	2,06	1,17
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,56	-2,46	-10,11	-1,30	-3,34	-10,30
Ratio +V(π)/-V(π) = UPM2/LPM2	0,70	1,80	5,61	1,09	1,93	4,41
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,61	-0,46	-0,35	-0,51	-0,41	-0,32
Ratio -E(π)/-V(π) = UPM1/UPM2	0,49	0,63	0,64	0,61	0,70	0,74

Alike the case in Soybeans and Corn, in Wheat there is not a clear pattern when comparing the results with different assumptions. What is clear is that the results are different and that in some cases could be of manifest importance.

Chapter 7 - Conclusions

One of our hypotheses was that the export taxes are not only suppressing the rent but taking away the profits of the productive units, leaving no possible reinvestment amounts for future production. Given that, in most cases, the probability distribution of profits exhibits larger masses on the downside area below the zero benchmark, it seems that the fixed export tax model and also the model with variable rate are withdrawing the rent as it was aimed but the government, plus some of the profits. This implies negative consequences for the farmers in Argentina, especially those operating with smaller scales or in marginal regions. If the intention is to redistribute extraordinary revenues from one sector to another, this research suggests that the transfer could in fact be excessive and that the actual fixed-rate export tax is being applied to all regions without considering if there is probability of positive profits (and therefore a potential rent) in the marginal areas like Santiago del Estero or East La Pampa, which do not have equal productive potential due to the weather and soil conditions.

In our study we test three models in each region. The results could help policy makers decide where and how to apply the taxes taking account of geographical variation. For example, while in North Buenos Aires or other highly productive regions the model with fixed export tax could be a positive option to raise government revenues, while in the marginal regions like Salta or Santiago del Estero it might be wiser to apply a variable-rate of export taxes to reduce the risk faced by farmers. In both cases, the value of the ad valorem tax should be analyzed to avoid driving farmers out of business. However, there is no reason to think that every farmer should be able to continue farming regardless of the ability to produce. Perhaps, there should be no farming in the marginal regions to protect the natural ecosystems. If the goal is to maintain agricultural production in marginal regions for some social purpose it would probably be more efficient to provide income supplements rather than trying to manipulate the export tax. However, it is not our objective in the current research to make such positive determinations.

The simulations with the current model with fixed-rate export taxes exhibited different results across regions. Some of the marginal areas have negative expected profits (return to owned land and family labor) with most of the probability mass under the zero benchmark, such as:

- For Corn: South Santa Fe, South Southeast Cordoba, Southeast Buenos Aires, Southwest Buenos Aires and west Buenos Aires.
- For Soybeans: Salta, Santiago del Estero, South Entre Rios, West Buenos Aires and Southeast Buenos Aires.
- For Sunflower: East La Pampa, Southeast Buenos Aires and South Southeast Cordoba.
- For Wheat: all regions.

These results express the difficult situation for the farmers in Argentina, especially for those regions which have less yield potential or are far from the markets (marginal areas), which means more costly freights. Farm households that appear to have persistent losses would either have to go out of business or they would have to have other sources of income to offset the losses on the farm. The main findings are listed below:

$$E\,(\pi_{\text{Fixed rate}}) < E\,(\pi_{\text{variable rate}}) < E\,(\pi_{\text{no tax}})$$

$$LPM_{0\ \text{Fixed rate}} > LPM_{0\ \text{variable rate}} > LPM_{0\ \text{no tax}}$$

$$LPM_{1\ \text{Fixed rate}} < LPM_{1\ \text{variable rate}} < LPM_{1\ \text{no tax}}$$

$$LPM_{2\ \text{Fixed rate}} > LPM_{2\ \text{variable rate}} > LPM_{2\ \text{no tax}}$$

$$UPM_{0\ \text{Fixed rate}} < UPM_{0\ \text{variable rate}} < UPM_{0\ \text{no tax}}$$

$$UPM_{1\ \text{Fixed rate}} < UPM_{1\ \text{variable rate}} < UPM_{1\ \text{no tax}}$$

$$UPM_{2\ \text{Fixed rate}} < UPM_{2\ \text{variable rate}} < UPM_{2\ \text{no tax}}$$

For all the crops and for all the regions, the variable-rate model showed higher overall expected profits than with the current model with fixed-rate export taxes. The dispersion measures show that, for corn and wheat, the model with variable-rate export taxes increases profit variability compared with the current model with fixed-rate export taxes. In contrast, the opposite occurs with the results for soybeans and sunflower. The risk measurements resulted in less risk in the downside area of the distributions and higher opportunity of profits in the upside for the model with variable rate export tax than with the model with fixed-rate export tax. It seems the variable-rate tax would allow the government to keep withholding revenues, but leaving farmers with a modest decrease in the risk profile and more upside potential when compared with the model with fixed-rate tax.

As expected, farmers' profits were highest when there were no export taxes. For soybeans, upside dispersion (indicating upside potential) in the model without an export tax is much larger than the downside dispersion (indicating downside risk) for all regions compared with the other two models. Sunflower has less dispersion in general than corn, soybeans and wheat, exhibiting a lower level of risk when there are no export taxes than the other crops.

Much was discussed about how to apply the taxes and in what degree. The scale of the farmers and the potential productivity of the region should be part of the analysis, like in this research where we try to include the effects on different regions and crops. It would be wise for policy applications to also consider the risk profile in the different regions when imposing taxes. Decreases in expected profit are already undesirable for farmers, but their situation can become even worse if this is followed by greater downside risk and limited upside potential.

Finally, potential differences in results by assuming that all variables follow a normal distribution were discussed. Under the normality assumption, for the case of corn there is not a clear pattern when comparing models run with the normality assumption for the endogenous variables or with the actual distribution. What it is clear is that differences in the results arise, and could potentially be of importance as for the case of the South Santa Fe region.

For soybeans, results in all regions change under the normality assumption as opposed to the fitted distributions, but without a clear pattern. Similarly, in wheat there is not a clear pattern in this comparison. In contrast, the results for sunflower under normality assumption seem to show a pattern across regions. The expected overall profits are often lower when normal distributions are assumed, while dispersion increases for the variable-rate model but decreases for the no-tax model.

It is clear, when results from the simulations with normal distributions were compared with the simulations with best fitted distributions that they differ and that, in some cases, these differences could be of importance with respect to expected profits and risk. Therefore, it seems that finding the best-fitted distributions for the simulated variables in the model is a more sound strategy than simply assuming that all variables follow a normal distribution.

Chapter 8 - Future Agenda

If it is possible to model the intensity of input use in a few typical productive units to measure the profit and the risk involved and how they react to taxation, we might think finding the optimum value of the tax as an optimization problem.

A further question would concern the measurement of the ecological cost involved in the agricultural activities with this model, in a way to measure the impact of these taxes in the farmer's decisions. If the farmers have a rational thinking that follows profitability in the short term driven by the exogenous variables like the export taxes, the long term sustainability of the ecological and productive systems might be in risk.

It would be interesting to further analyze the effects that the export taxes have on the profits functions in order to foresee the possible shifts in the farmer's crop choice in each region. That would help in preventing excessive substitution between crops due to taxation.

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Appendix

10.1. Monte Carlo Simulation Outputs

Corn ***N BSAS*** ***Fitted distributions***

11:54:37 a.m. 0:03:12 11:57:49 a.m.

Sample Size (n):	5000
Refresh Interval (ni):	100
Progress:	100%
Calculate Results:	*VERDADERO*

Run Simulation

Press Esc to force the simulation to stop

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
Mean:	32,9235208	149,950167	512,915499	295,749605	170,27985
StErr:	3,18876216	3,25553773	9,11774337	2,53472829	0,44169311
Median:	41,3025917	154,985908	386,054827	256,045641	180,277162

Spread

	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
StDev:	225,479535	230,20128	644,721817	179,232356	31,2324196
Min:	-1259,55334	-1129,3767	-934,79119	49,3561055	38,1607078
Max:	1146,96805	991,073094	9748,32779	4235,73305	380,097277
Range:	2406,52139	2120,44976	10683,119	4186,37694	341,936569

Quartiles

	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
Q(.25):	-116,360394	15,0131832	158,653336	200,003802	154,152983
Q(.75):	169,774395	305,825802	694,948534	338,476955	191,769448
IQ Range:	286,13479	290,812618	536,295198	138,473152	37,6164652

Shape

	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
Skewness:	0,00246308	-0,2349019	4,24048582	6,21753254	-0,9690359
Kurtosis:	0,79101668	0,41981635	35,825815	89,511795	1,73581222

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
Q(.05):	-337,617003	-242,51348	-119,70069	137,500032	106,311033
Q(.95):	402,141249	518,317674	1510,22604	575,682642	203,231982

95% Interval (0.025 and 0.975 Quantiles)

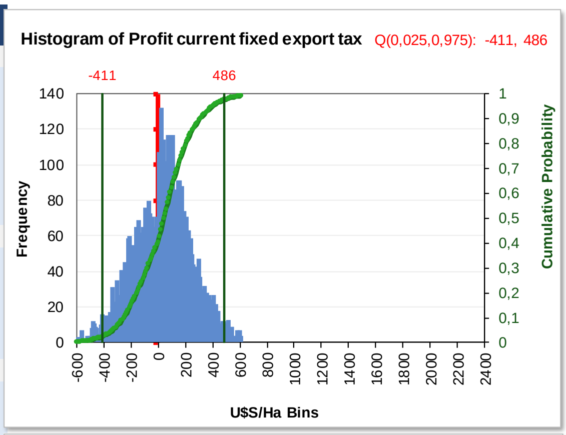
	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
Q(.025):	-410,675586	-330,7291	-199,86619	119,742768	92,5816315
Q(.975):	485,537558	581,103763	1973,38224	718,642496	210,140258

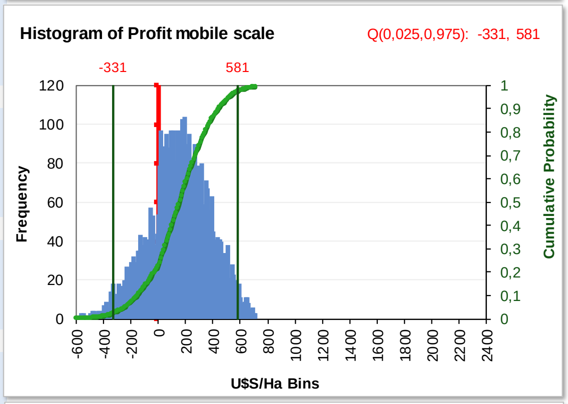
Custom Interval

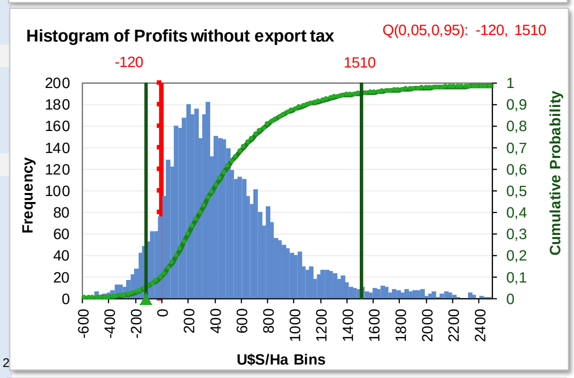
	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-410,675586	-330,7291	-119,70069	119,742768	92,5816315
Q(1-α/2):	485,537558	581,103763	1510,22604	718,642496	210,140258
Sig Digits:	3	3	3	3	3
Q(α/2):	-411	-331	-120	120	92,6
Q(1-α/2):	486	581	1510	719	210
Label:	Q(0,025,0,975): -4	Q(0,025,0,975): -	Q(0,05,0,95): -12	Q(0,025,0,975): 1	Q(0,025,0,975): 92,6, 2

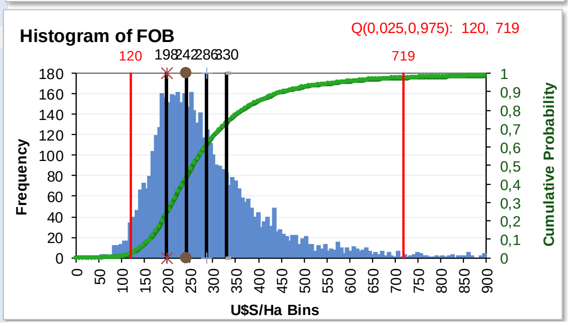
Probabilities

	Profit current fixed ex	ofit mobile sca	s without expo	FOB	FAS mobile
A:	-410,675586	-330,7291			
Pr(y>A):	97,50%	97,50%	89,86%	100,00%	100,00%
B:	485,537558	581,103763			
Pr(y<B):	97,50%	97,50%	10,14%	0,00%	0,00%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Corn S Entre Rios *Fitted distributions*

01:32:49 p.m. 0:11:14 01:44:03 p.m.

Sample Size (n): 5000
Refresh Interval (ni): 100
Progress: 100%
Calculate Results: *VERDADERO*

Run Simulation

Press Esc to force the simulation to stop

Central Tendancy (Location)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Mean:	-25,4560136	112,267666	353,064241	185,494587	730,183211
StErr:	3,3606833	3,43820818	7,38236903	3,99316316	10,9903881
Median:	-2,69372245	120,815645	265,131426	162,97827	574,168471

Spread

	Profits	Profits mobile	Profits w/o	GM	GM w/o
StDev:	237,636195	243,118032	522,01232	282,359275	777,137795
Min:	-3388,58504	-3289,795	-3148,5689	-3273,5269	-3033,5108
Max:	858,757293	765,478021	7084,90074	1440,79965	11079,3222
Range:	4247,34234	4055,273	10233,4697	4714,32659	14112,8331

Quartiles

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.25):	-167,915095	-21,732579	58,7924964	9,40916351	261,462201
Q(.75):	123,152801	273,401924	539,036048	350,264005	999,828442
IQ Range:	291,067896	295,134503	480,243551	340,854842	738,366241

Shape

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Skewness:	-1,18862193	-1,3141141	3,02806596	-0,2870182	3,45855192
Kurtosis:	10,4369748	9,9179485	23,2488193	6,08706026	26,0153842

90% Interval (0.05 and 0.95 Quantiles)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.05):	-388,529332	-271,17842	-218,02288	-199,67511	-30,942183
Q(.95):	323,316589	470,842454	1195,79556	668,39805	2007,87298

95% Interval (0.025 and 0.975 Quantiles)

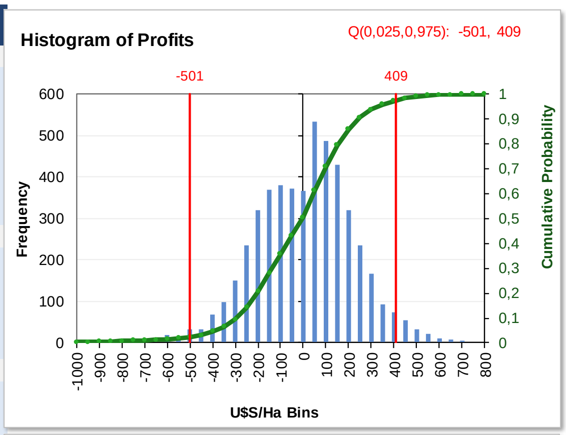
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.025):	-500,551636	-384,56445	-324,28668	-309,28139	-129,47925
Q(.975):	408,799455	523,821701	1551,40598	787,237065	2536,50611

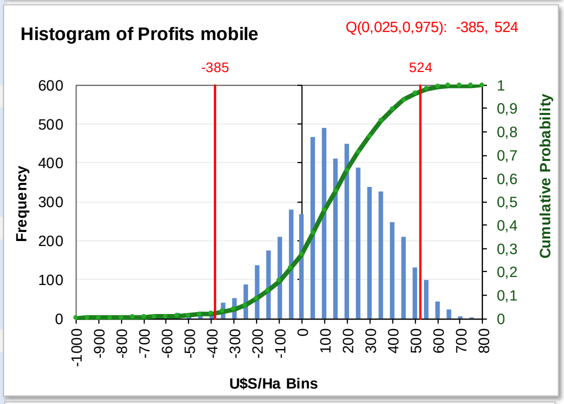
Custom Interval

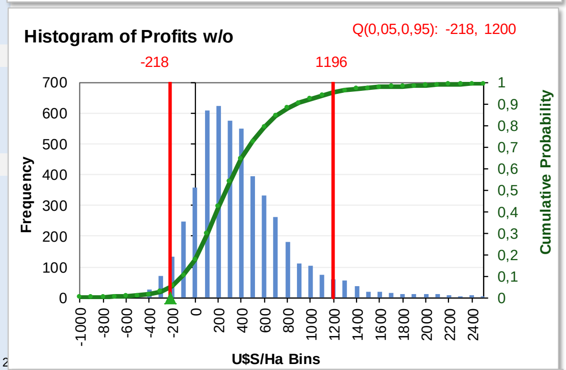
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-500,551636	-384,56445	-218,02288	-309,28139	-129,47925
Q(1-α/2):	408,799455	523,821701	1195,79556	787,237065	2536,50611
Sig Digits:	3	3	3	3	3
Q(α/2):	-501	-385	-218	-309	-129
Q(1-α/2):	409	524	1200	787	2540
Label:	Q(0,025,0,975): -5	Q(0,025,0,975): -:	Q(0,05,0,95): -21	Q(0,025,0,975): -:	Q(0,025,0,975): -129, 2

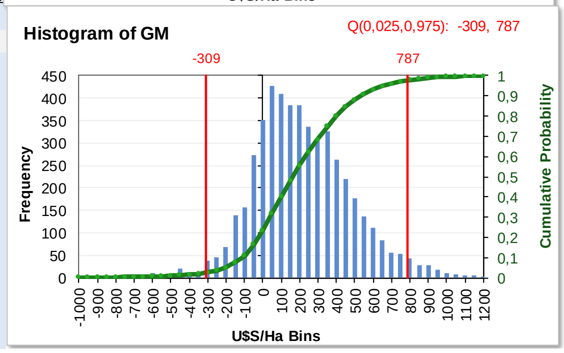
Probabilities

	Profits	Profits mobile	Profits w/o	GM	GM w/o
A:	-500,551636	-384,56445			
Pr(y>A):	97,50%	97,50%	82,37%	76,58%	93,75%
B:	408,799455	523,821701			
Pr(y<B):	97,50%	97,50%	17,63%	23,42%	6,25%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Corn S Santa Fe *Fitted distributions*

Sample Size (n):	5000
Refresh Interval (ni):	100
Progress:	100%
Calculate Results:	*VERDADERO*

0:01:56

Run Simulation

Press Esc to force the simulation to stop

Central Tendancy (Location)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Mean:	-133,797328	-21,983797	182,532936	60,5747658	487,606679
StErr:	4,93183419	5,66319157	10,0429782	6,46644628	14,9637037
Median:	-147,366445	-35,90779	79,4352505	19,5454776	292,201656

Spread

	Profits	Profits mobile	Profits w/o	GM	GM w/o
StDev:	348,73334	400,448116	710,145802	457,246801	1058,09364
Min:	-4246,62515	-4220,8118	-4093,298	-4069,3782	-3916,051
Max:	8718,85103	9559,12733	21247,6567	13594,6892	32857,5562
Range:	12965,4762	13779,9391	25340,9547	17664,0674	36773,6072

Quartiles

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.25):	-264,941096	-167,92951	-78,872775	-90,729019	94,8795492
Q(.75):	-9,34506144	80,5904202	281,619756	150,7305	600,365731
IQ Range:	255,596034	248,519925	360,492531	241,459519	505,486182

Shape

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Skewness:	6,03496186	7,56632206	11,3774704	10,8392667	12,5755312
Kurtosis:	149,113212	159,835247	248,403701	259,311824	280,52365

90% Interval (0.05 and 0.95 Quantiles)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.05):	-492,827485	-412,47061	-349,10166	-321,79563	-168,01295
Q(.95):	242,07746	393,163127	989,46659	542,209969	1685,48418

95% Interval (0.025 and 0.975 Quantiles)

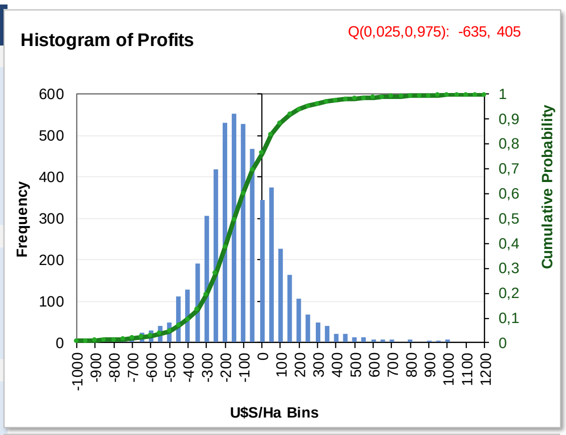
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.025):	-634,819025	-538,61945	-470,58347	-458,72025	-287,76728
Q(.975):	405,467863	623,091856	1448,69872	782,824933	2391,93568

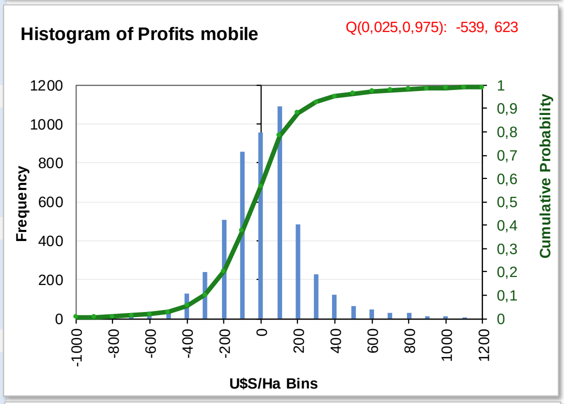
Custom Interval

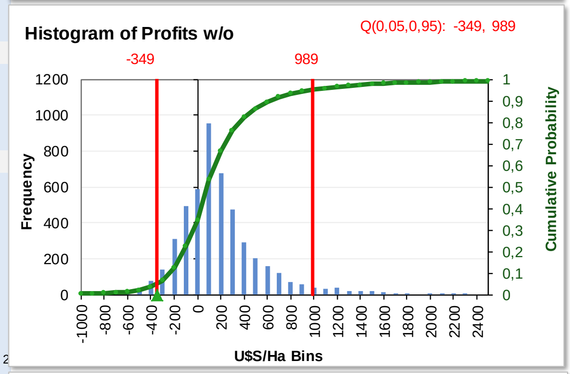
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-634,819025	-538,61945	-349,10166	-458,72025	-287,76728
Q(1-α/2):	405,467863	623,091856	989,46659	782,824933	2391,93568
Sig Digits:	3	3	3	3	3
Q(α/2):	-635	-539	-349	-459	-288
Q(1-α/2):	405	623	989	783	2390
Label:	Q(0,025,0,975): -6	Q(0,025,0,975): -5	Q(0,05,0,95): -349	Q(0,025,0,975): -4	Q(0,025,0,975): -288, 2

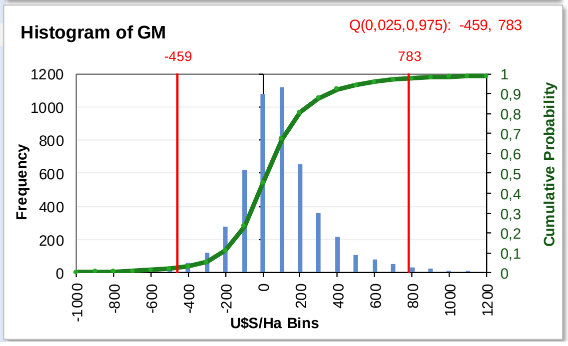
Probabilities

	Profits	Profits mobile	Profits w/o	GM	GM w/o
A:	-634,819025	-538,61945			
Pr(y>A):	97,50%	97,50%	65,71%	55,10%	85,37%
B:	405,467863	623,091856			
Pr(y<B):	97,50%	97,50%	34,29%	44,90%	14,63%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Corn S SE Cordoba *Fitted distributions*

		02:16:25 p.m.	0:11:00	02:27:25 p.m.
Sample Size (n):	5000	Run Simulation		
Refresh Interval (ni):	100			
Progress:	100%			
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*		

Central Tendancy (Location)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Mean:	-366,244572	-314,72922	-157,82048	-173,47679	59,422104
StErr:	2,08853453	2,1771719	3,83886239	1,92757586	4,80485053
Median:	-367,473221	-316,95637	-196,68497	-174,20597	-5,7587892

Spread

	Profits	Profits mobile	Profits w/o	GM	GM w/o
StDev:	147,681693	153,949302	271,448563	136,300196	339,754239
Min:	-841,574515	-788,58106	-886,68222	-634,64358	-649,34577
Max:	340,573114	308,607887	4286,74004	695,175774	6995,95903
Range:	1182,14763	1097,18895	5173,42225	1329,81935	7645,3048

Quartiles

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.25):	-463,291337	-419,01246	-333,40896	-259,59449	-135,57759
Q(.75):	-275,273039	-213,42911	-11,913845	-92,73593	170,64976
IQ Range:	188,018298	205,58335	321,495115	166,858564	306,227352

Shape

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Skewness:	0,2134286	0,09536973	2,43149465	0,31289974	4,29356338
Kurtosis:	0,32265169	-0,0430292	20,9400265	1,07749564	48,9448123

90% Interval (0.05 and 0.95 Quantiles)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.05):	-605,016568	-563,83539	-502,28055	-388,79951	-292,5926
Q(.95):	-114,649259	-50,544037	264,935466	51,7675319	581,377132

95% Interval (0.025 and 0.975 Quantiles)

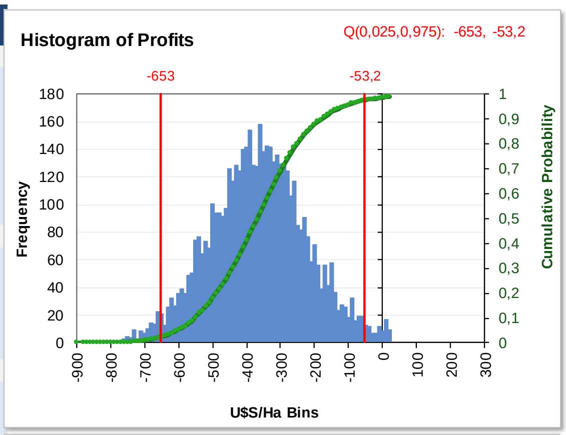
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.025):	-652,613792	-615,54781	-558,74045	-443,22419	-344,75098
Q(.975):	-53,2173318	2,59100352	414,07095	112,097612	829,475024

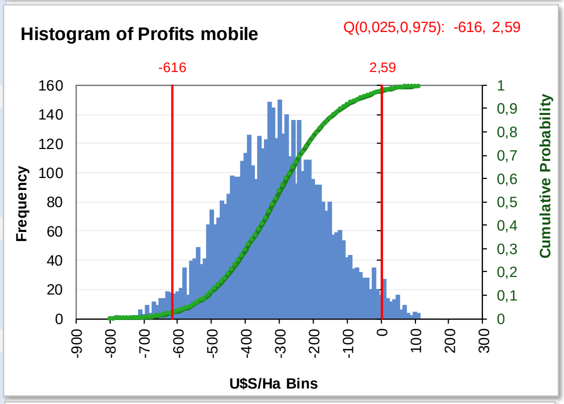
Custom Interval

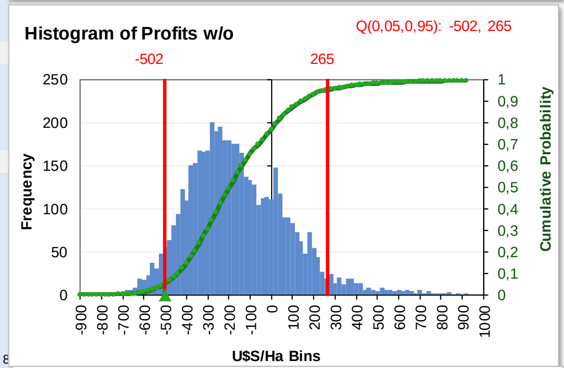
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-652,613792	-615,54781	-502,28055	-443,22419	-344,75098
Q(1-α/2):	-53,2173318	2,59100352	264,935466	112,097612	829,475024
Sig Digits:	3	3	3	3	3
Q(α/2):	-653	-616	-502	-443	-345
Q(1-α/2):	-53,2	2,59	265	112	829
Label:	Q(0,025,0,975): -6	Q(0,025,0,975): -(	Q(0,05,0,95): -50;	Q(0,025,0,975): -4	Q(0,025,0,975): -345, 8

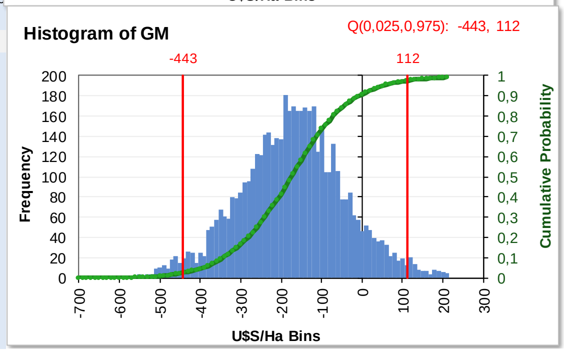
Probabilities

	Profits	Profits mobile	Profits w/o	GM	GM w/o
A:	-652,613792	-615,54781			
Pr(y>A):	97,50%	97,50%	23,52%	9,39%	48,72%
B:	-53,2173318	2,59100352			
Pr(y<B):	97,50%	97,50%	76,48%	90,61%	51,28%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Corn SE BS AS

Fitted distributions

	02:38:40 p.m.	0:11:52	02:50:32 p.m.
Sample Size (n):	5000	Run Simulation	
Refresh Interval (ni):	100		
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Mean:	-149,072935	-43,425371	243,671965	52,8269992	586,962722
StErr:	3,10134563	3,17358698	7,81578874	3,5232419	11,6406847
Median:	-162,242272	-30,930958	151,338216	22,2811025	414,855797

Spread

	Profits	Profits mobile	Profits w/o	GM	GM w/o
StDev:	219,298252	224,406487	552,659722	249,130824	823,120712
Min:	-1020,03227	-967,84202	-970,00046	-869,58762	-901,5149
Max:	869,630731	968,949407	19677,2928	1604,43778	30390,3147
Range:	1889,663	1936,79142	20647,2933	2474,0254	31291,8296

Quartiles

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.25):	-300,383598	-197,94638	-31,724916	-114,51983	149,902746
Q(.75):	5,92941733	105,529687	403,273662	186,106507	799,805466
IQ Range:	306,313015	303,476063	434,998578	300,626332	649,90272

Shape

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Skewness:	0,24884178	0,00409699	10,5786366	0,87232559	11,5814987
Kurtosis:	0,50753391	0,23627906	316,479836	2,00803747	355,902704

90% Interval (0.05 and 0.95 Quantiles)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.05):	-481,02938	-409,55826	-314,52405	-289,39729	-122,35147
Q(.95):	218,96331	312,788032	1062,62811	515,782466	1818,74143

95% Interval (0.025 and 0.975 Quantiles)

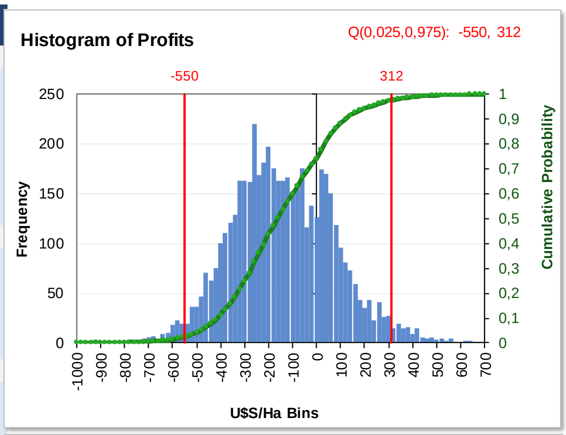
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.025):	-550,336235	-484,01172	-377,38253	-351,26584	-186,106
Q(.975):	311,687688	390,929122	1435,27669	649,820181	2396,16894

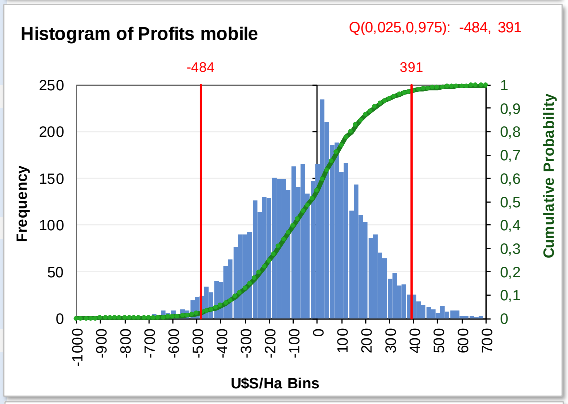
Custom Interval

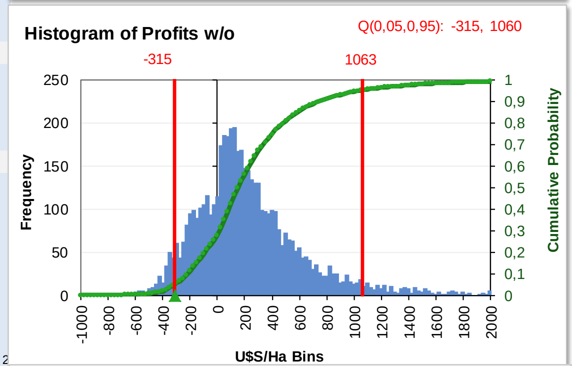
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-550,336235	-484,01172	-314,52405	-351,26584	-186,106
Q(1-α/2):	311,687688	390,929122	1062,62811	649,820181	2396,16894
Sig Digits:	3	3	3	3	3
Q(α/2):	-550	-484	-315	-351	-186
Q(1-α/2):	312	391	1060	650	2400
Label:	Q(0,025,0,975): -5	Q(0,025,0,975): -4	Q(0,05,0,95): -31	Q(0,025,0,975): -3	Q(0,025,0,975): -186, 2

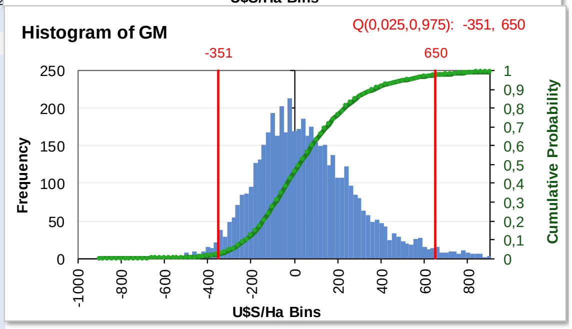
Probabilities

	Profits	Profits mobile	Profits w/o	GM	GM w/o
A:	-550,336235	-484,01172			
Pr(y>A):	97,50%	97,50%	72,20%	53,99%	87,60%
B:	311,687688	390,929122			
Pr(y<B):	97,50%	97,50%	27,80%	46,01%	12,40%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Corn SW BSAS *Fitted distributions*

Sample Size (n):	5000	0:02:33	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Mean:	-41,6901925	62,839088	385,149923	186,822653	799,056062
StErr:	3,20720193	3,329995	9,02482504	3,9754143	13,6669142
Median:	-44,1731946	58,764026	265,546663	147,130694	596,160898

Spread

	Profits	Profits mobile	Profits w/o	GM	GM w/o
StDev:	226,783423	235,466204	638,151499	281,104241	966,396768
Min:	-703,150856	-657,63972	-602,28165	-508,96004	-408,09083
Max:	2046,12398	1998,40817	21144,543	3434,16561	32791,6161
Range:	2749,27484	2656,04789	21746,8247	3943,12565	33199,7069

Quartiles

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.25):	-201,649382	-94,940156	59,0223688	-4,131484	283,244605
Q(.75):	94,6760001	208,933347	567,658184	331,229679	1063,23563
IQ Range:	296,325382	303,873503	508,635815	335,361163	779,991027

Shape

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Skewness:	0,53953662	0,30983318	9,69121037	1,35195386	10,2094034
Kurtosis:	2,17549644	1,18408825	247,070246	5,94991877	264,826709

90% Interval (0.05 and 0.95 Quantiles)

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.05):	-396,632479	-317,13873	-218,46867	-183,67775	-24,681218
Q(.95):	337,176403	459,074263	1292,51902	701,67196	2183,03701

95% Interval (0.025 and 0.975 Quantiles)

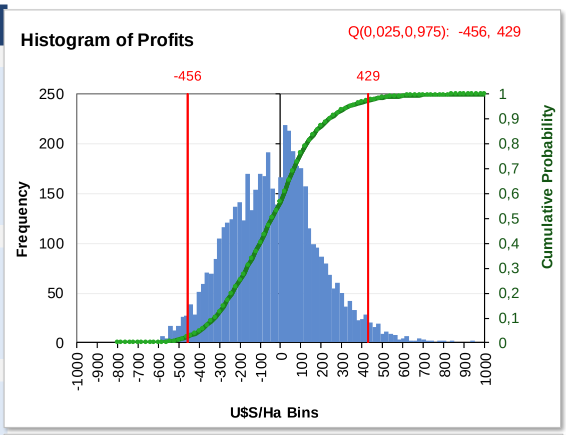
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Q(.025):	-455,829612	-392,22442	-291,94339	-243,38754	-93,516931
Q(.975):	429,170779	541,355115	1675,02833	853,936463	2794,79397

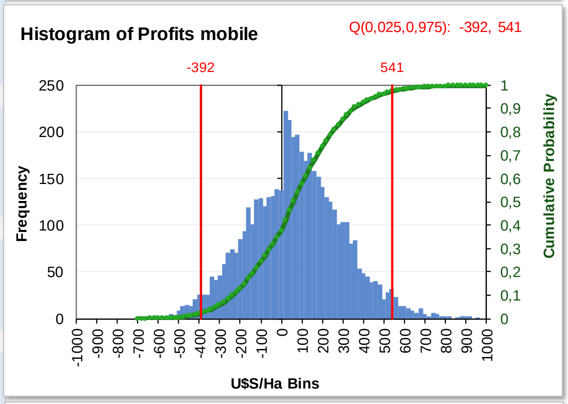
Custom Interval

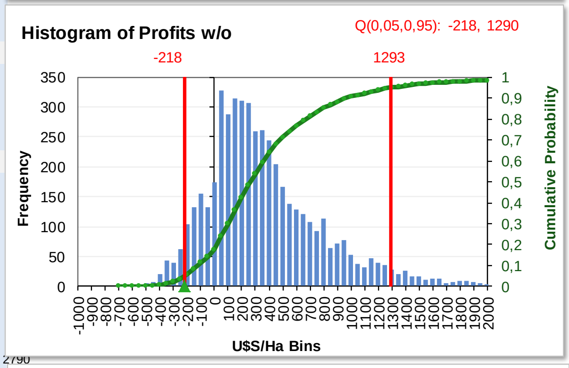
	Profits	Profits mobile	Profits w/o	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-455,829612	-392,22442	-218,46867	-243,38754	-93,516931
Q(1-α/2):	429,170779	541,355115	1292,51902	853,936463	2794,79397
Sig Digits:	3	3	3	3	3
Q(α/2):	-456	-392	-218	-243	-93,5
Q(1-α/2):	429	541	1290	854	2790
Label:	Q(0,025,0,975): -4	Q(0,025,0,975): -:	Q(0,05,0,95): -21(	Q(0,025,0,975): -:	Q(0,025,0,975): -93,5, 2790

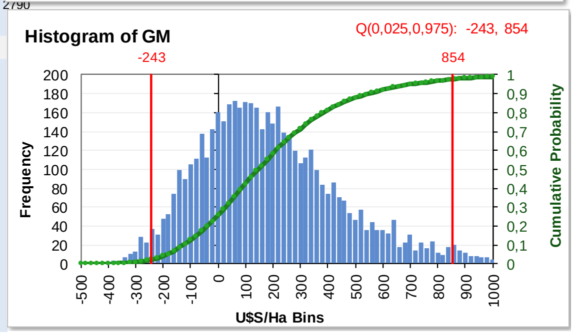
Probabilities

	Profits	Profits mobile	Profits w/o	GM	GM w/o
A:	-455,829612	-392,22442			
Pr(y>A):	97,50%	97,50%	82,34%	74,15%	93,93%
B:	429,170779	541,355115			
Pr(y<B):	97,50%	97,50%	17,66%	25,85%	6,07%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1





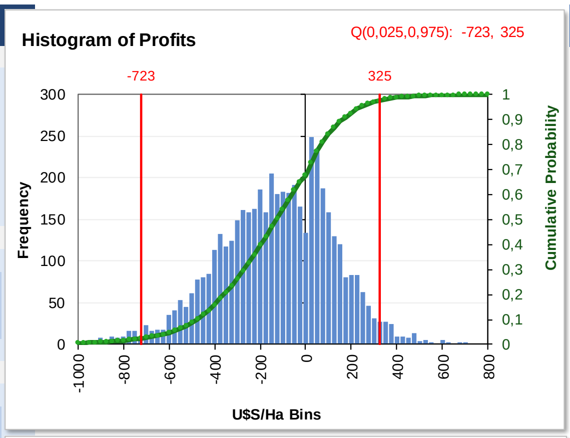


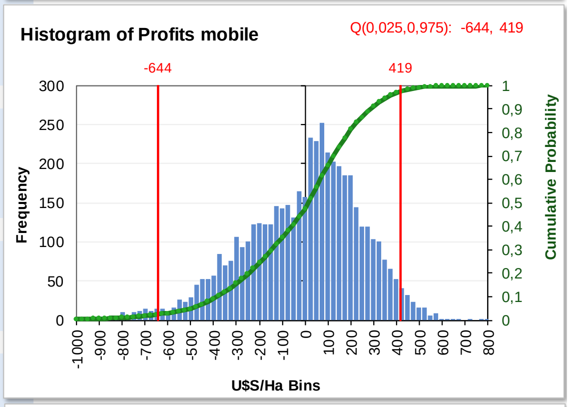


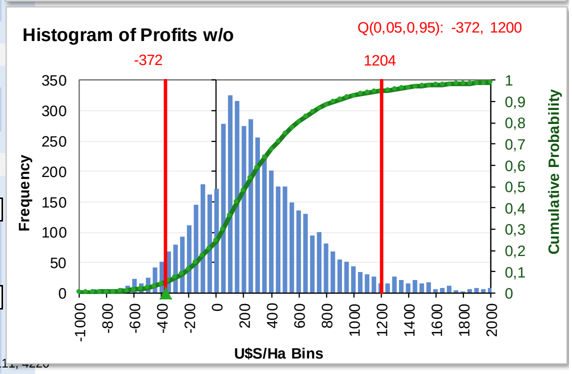
Corn W BSAS Fitted distributions

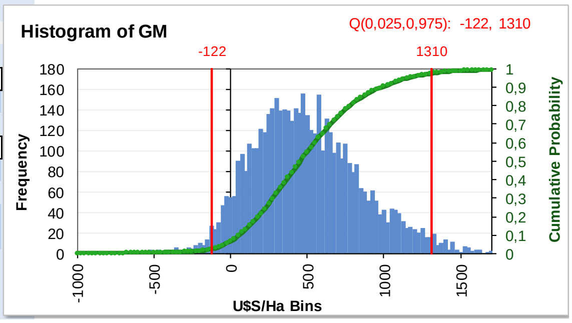
Sample Size (n):	5000	05:12:42 p.m. 0:02:20 05:15:02 p.m.
Refresh Interval (ni):	100	Run Simulation
Progress:	100%	
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*

	Profits	Profits mobile	Profits w/o	GM	GM w/o
Central Tendancy (Location)					
Mean:	-147,7699836	-29,210791	294,768915	489,238408	1421,29306
StErr:	3,841264919	3,8919535	7,74362415	5,35210976	16,9152874
Median:	-127,9913979	14,579294	217,867099	456,197021	1169,52446
Spread					
StDev:	271,6184473	275,202671	547,556915	378,451311	1196,09144
Min:	-2378,635955	-2490,181	-1598,1958	-1737,9151	-1026,0936
Max:	878,8064392	780,682342	9361,43508	2436,29079	23591,5331
Range:	3257,442395	3270,86339	10959,6308	4174,20591	24617,6268
Quartiles					
Q(.25):	-311,95194	-195,85049	8,8366089	231,542683	718,034496
Q(.75):	37,85357749	157,652716	504,076	710,670671	1820,15279
IQ Range:	349,8055175	353,503203	495,239392	479,127988	1102,11829
Shape					
Skewness:	-0,766724794	-0,9709025	3,27966857	0,43292464	4,70671073
Kurtosis:	3,135639215	3,10082178	33,5615656	1,64417252	58,1181595
90% Interval (0.05 and 0.95 Quantiles)					
Q(.05):	-590,0324342	-494,87648	-371,9444	-36,531347	225,747751
Q(.95):	244,8414073	356,785602	1204,45747	1154,63617	3451,40413
95% Interval (0.025 and 0.975 Quantiles)					
Q(.025):	-722,5806322	-643,52661	-488,29474	-122,42185	110,680699
Q(.975):	324,8664936	418,525376	1525,44017	1310,61739	4223,29802
Custom Interval					
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-722,5806322	-643,52661	-371,9444	-122,42185	110,680699
Q(1-α/2):	324,8664936	418,525376	1204,45747	1310,61739	4223,29802
Sig Digits:	3	3	3	3	3
Q(α/2):	-723	-644	-372	-122	111
Q(1-α/2):	325	419	1200	1310	4220
Label:	Q(0,025,0,975): -723, 3	Q(0,025,0,975): -(	Q(0,05,0,95): -37;	Q(0,025,0,975): -:	Q(0,025,0,975): 111, 4220
Probabilities					
A:	-722,5806322	-643,52661			
Pr(y>A):	97,50%	97,50%	75,62%	93,29%	98,62%
B:	324,8664936	418,525376			
Pr(y<B):	97,50%	97,50%	24,38%	6,71%	1,38%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy N BS AS *Fitted distributions*

Sample Size (n):	5000	04:02:32 p.m.	0:02:06	04:04:38 p.m.
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
Mean:	68,7194647	98,1828382	419,963935	278,081557	799,176536
StErr:	2,48889046	2,21318851	5,34597644	3,29560651	8,12523737
Median:	72,1307075	110,292127	359,111353	262,287364	704,541226

Spread

	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
StDev:	175,991132	156,49606	378,017619	233,034571	574,541044
Min:	-500,142201	-508,24759	-416,64808	-339,27566	-261,6883
Max:	692,660456	591,825207	6611,75754	1271,81761	10347,448
Range:	1192,80266	1100,0728	7028,40563	1611,09328	10609,1363

Quartiles

	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-45,2863042	7,49750536	192,247852	108,996437	446,352815
Q(.75):	182,371888	204,304626	573,568262	420,569919	1028,40994
IQ Range:	227,658192	196,807121	381,32041	311,573482	582,057125

Shape

	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
Skewness:	-0,02419626	-0,3183467	3,28864189	0,45769748	3,40271384
Kurtosis:	0,04990719	0,14337125	29,9981724	0,06713674	31,2334667

90% Interval (0.05 and 0.95 Quantiles)

	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-232,236595	-186,6735	-13,25671	-70,949337	145,846778
Q(.95):	363,539408	344,418258	1035,42953	700,22207	1731,03039

95% Interval (0.025 and 0.975 Quantiles)

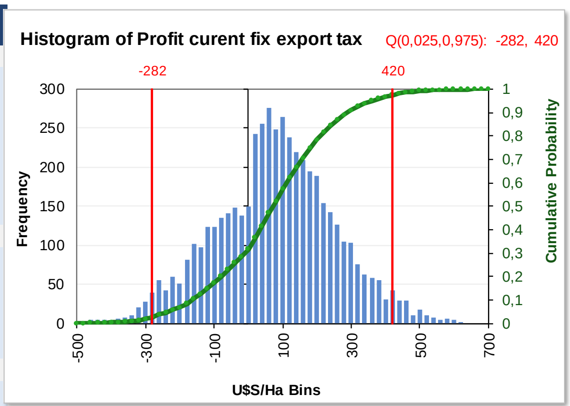
	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-281,636932	-236,72283	-92,486422	-118,06503	65,031159
Q(.975):	420,279709	382,114273	1273,92964	792,599468	2099,16781

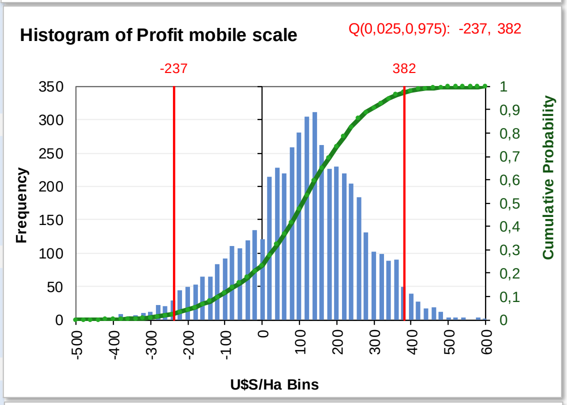
Custom Interval

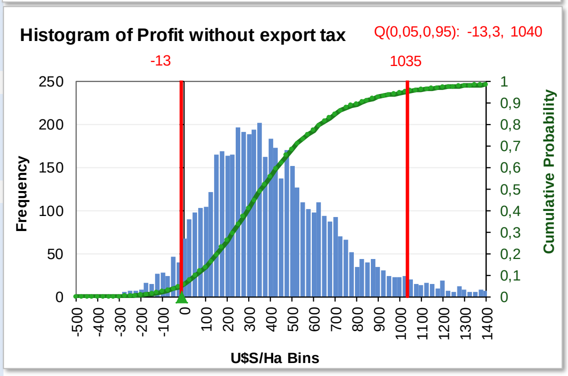
	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-281,636932	-236,72283	-13,25671	-118,06503	65,031159
Q(1-α/2):	420,279709	382,114273	1035,42953	792,599468	2099,16781
Sig Digits:	3	3	3	3	3
Q(α/2):	-282	-237	-13,3	-118	65
Q(1-α/2):	420	382	1040	793	2100
Label:	Q(0,025,0,975): -2	Q(0,025,0,975): -2	Q(0,05,0,95): -13,	Q(0,025,0,975): -1	Q(0,025,0,975): 65, 210

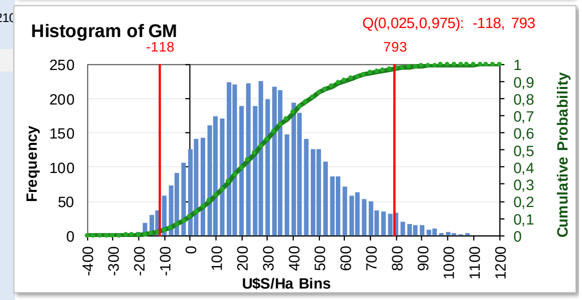
Probabilities

	Profit curent fix expo	ofit mobile sca	without expo	GM	GM w/o
A:	-281,636932	-236,72283			
Pr(y>A):	97,50%	97,50%	94,14%	88,82%	98,78%
B:	420,279709	382,114273			
Pr(y<B):	97,50%	97,50%	5,86%	11,18%	1,22%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy ***S Entre Rios*** ***Fitted distributions***

Sample Size (n):	5000	0:01:52	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
Mean:	-78,8087349	-44,372093	240,939109	172,691785	615,424681
StErr:	2,08408031	1,8175355	4,85657747	2,37771775	7,32209112
Median:	-78,3047402	-30,778189	185,018126	157,971296	521,195688

Spread

	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
StDev:	147,366732	128,519168	343,411887	168,130035	517,750028
Min:	-564,148768	-548,17274	-490,84751	-260,10847	-187,58013
Max:	525,14187	380,952193	8033,07685	1020,87856	12652,1519
Range:	1089,29064	929,124931	8523,92436	1280,98704	12839,732

Quartiles

	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
Q(.25):	-185,836445	-130,67558	66,735852	52,112963	338,708782
Q(.75):	28,0069192	47,6888089	342,133993	273,439065	760,466361
IQ Range:	213,843364	178,364387	275,398141	221,326102	421,757579

Shape

	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
Skewness:	0,02464637	-0,3577043	6,19325021	0,53750335	6,63714865
Kurtosis:	-0,29026673	-0,1023222	94,12261	0,40319026	102,825394

90% Interval (0.05 and 0.95 Quantiles)

	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
Q(.05):	-320,888044	-273,17882	-126,95534	-75,635722	118,604005
Q(.95):	154,242164	146,771586	751,053831	475,97937	1394,86775

95% Interval (0.025 and 0.975 Quantiles)

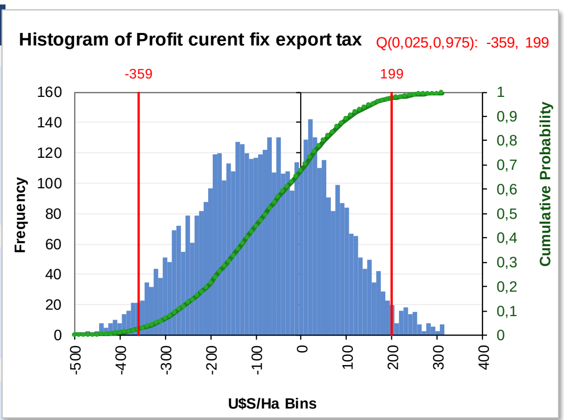
	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
Q(.025):	-358,702996	-316,54486	-186,24763	-111,57619	52,4108641
Q(.975):	199,423716	178,824116	1016,93631	547,793097	1796,94909

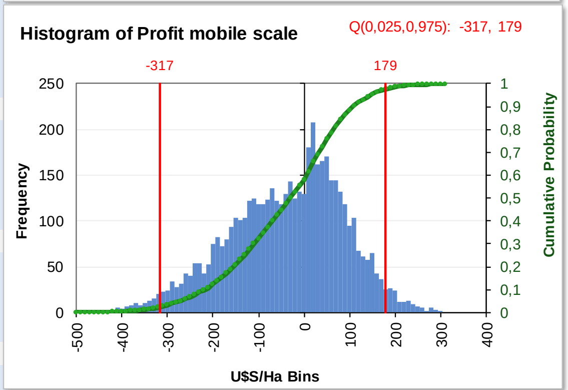
Custom Interval

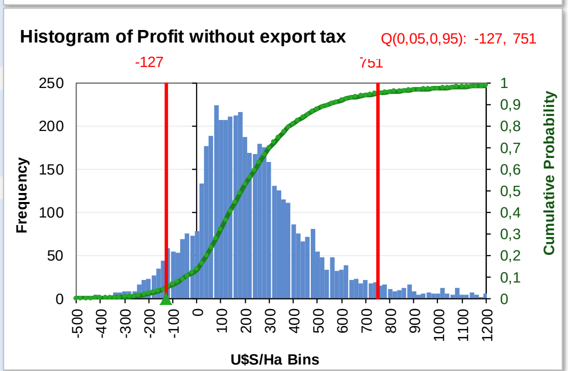
	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-358,702996	-316,54486	-126,95534	-111,57619	52,4108641
Q(1-α/2):	199,423716	178,824116	751,053831	547,793097	1796,94909
Sig Digits:	3	3	3	3	3
Q(α/2):	-359	-317	-127	-112	52,4
Q(1-α/2):	199	179	751	548	1800
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -:	Q(0,05,0,95): -12	Q(0,025,0,975): -:	Q(0,025,0,975): 52,4, 1

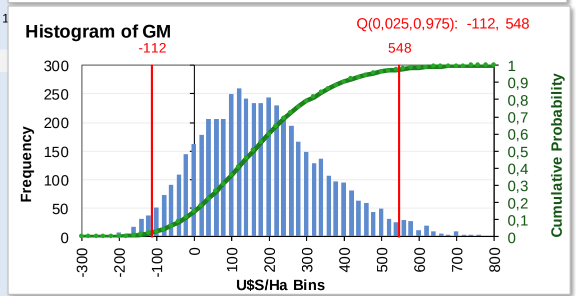
Probabilities

	Profit curent fix exp	rofit mobile sca	without expo	GM	GM w/o
A:	-358,702996	-316,54486			
Pr(y>A):	97,50%	97,50%	86,51%	85,28%	98,68%
B:	199,423716	178,824116			
Pr(y<B):	97,50%	97,50%	13,49%	14,72%	1,32%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy S Santa Fe *Fitted distributions*

Sample Size (n):	5000	0:11:12	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	104,47138	138,137121	492,131441	324,606114	909,105197
StErr:	2,17811659	1,79761938	5,5565924	2,93718298	8,49930714
Median:	105,121644	139,848428	417,072764	310,703083	791,697

Spread

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	154,016101	127,110885	392,910417	207,6902	600,991771
Min:	-551,778331	-435,46078	-285,72604	-371,35083	-145,83293
Max:	691,567724	647,556787	6009,26511	1133,22603	9411,31655
Range:	1243,34605	1083,01756	6294,99115	1504,57686	9557,14948

Quartiles

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	11,1251984	60,8275579	262,74308	173,158906	558,2302
Q(.75):	206,621545	224,371947	613,590954	464,632545	1095,85469
IQ Range:	195,496347	163,544389	350,847874	291,473639	537,624489

Shape

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	-0,11031682	-0,2712405	3,34869371	0,30110062	3,40988231
Kurtosis:	0,26773312	0,51484073	23,6753438	-0,0692651	24,2458894

90% Interval (0.05 and 0.95 Quantiles)

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-164,00739	-82,112514	80,3084297	5,86501402	281,49144
Q(.95):	352,852841	337,597738	1146,13039	683,077416	1909,93266

95% Interval (0.025 and 0.975 Quantiles)

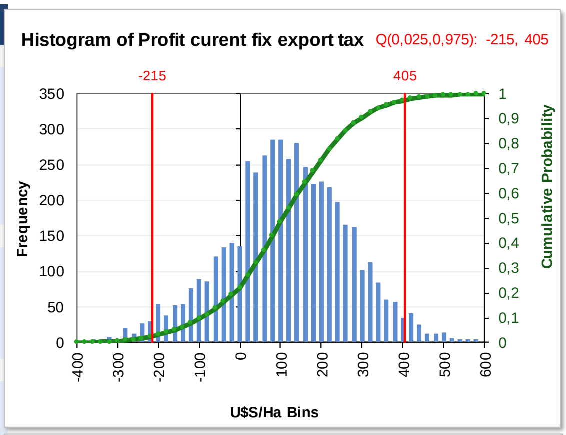
	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-214,816285	-133,53729	30,0877037	-44,784715	214,058922
Q(.975):	404,829981	376,926791	1453,87307	755,94704	2376,50452

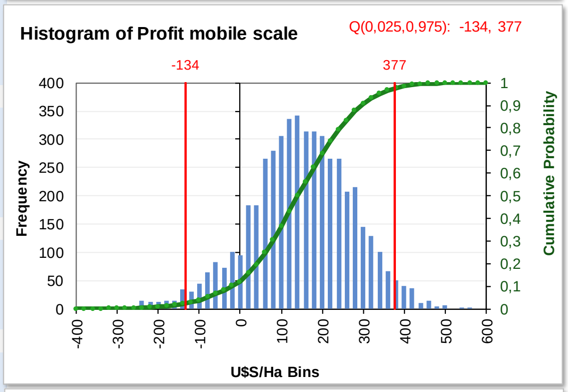
Custom Interval

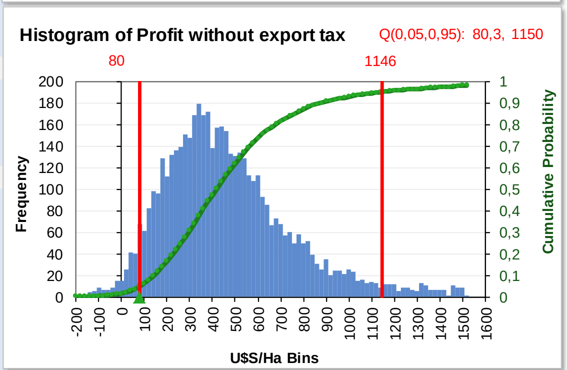
	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-214,816285	-133,53729	80,3084297	-44,784715	214,058922
Q(1-α/2):	404,829981	376,926791	1146,13039	755,94704	2376,50452
Sig Digits:	3	3	3	3	3
Q(α/2):	-215	-134	80,3	-44,8	214
Q(1-α/2):	405	377	1150	756	2380
Label:	Q(0,025,0,975): -2	Q(0,025,0,975): -	Q(0,05,0,95): 80,	Q(0,025,0,975): -	Q(0,025,0,975): 214, 2

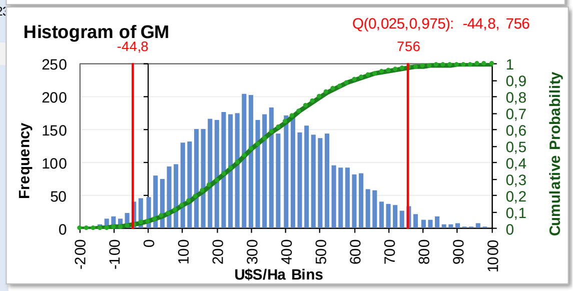
Probabilities

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-214,816285	-133,53729			
Pr(y>A):	97,50%	97,50%	98,49%	95,47%	99,90%
B:	404,829981	376,926791			
Pr(y<B):	97,50%	97,50%	1,51%	4,53%	0,10%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy S SE Cordoba

Fitted distributions

Sample Size (n):	5000	08:10:58 p.m. 0:02:39 08:13:37 p.m.	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	160,586983	184,483364	540,266542	351,179473	925,167136
StErr:	3,14454212	2,95430918	7,58580473	4,64833666	11,6600995
Median:	122,861899	146,530348	414,598069	282,343768	731,143749

Spread

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	222,352705	208,901206	536,397397	328,687037	824,493544
Min:	-287,313144	-224,73619	-203,28668	-193,99124	-109,9813
Max:	1346,52712	1448,99301	7628,24192	2164,89194	11829,0761
Range:	1633,84027	1673,72921	7831,5286	2358,88318	11939,0574

Quartiles

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	9,16307983	31,9659042	208,887759	107,420709	414,725488
Q(.75):	276,539104	299,705633	714,73243	518,789781	1192,94239
IQ Range:	267,376024	267,739729	505,844671	411,369072	778,216899

Shape

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	1,04703574	0,96643018	3,71935022	1,24152769	3,72993041
Kurtosis:	1,68168998	1,22297145	28,2049399	2,03730973	28,2995181

90% Interval (0.05 and 0.95 Quantiles)

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-136,083601	-90,102035	35,3086179	-42,836637	147,669767
Q(.95):	583,759191	573,643878	1432,32999	991,466058	2296,97322

95% Interval (0.025 and 0.975 Quantiles)

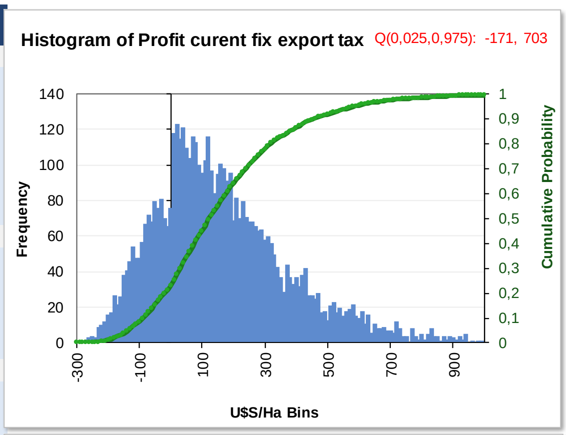
	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-170,559256	-120,86258	-2,6711135	-77,206292	90,7222878
Q(.975):	702,942158	678,547273	1824,46781	1174,79263	2900,24617

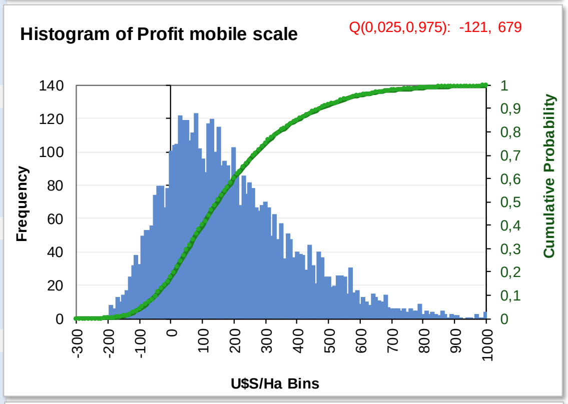
Custom Interval

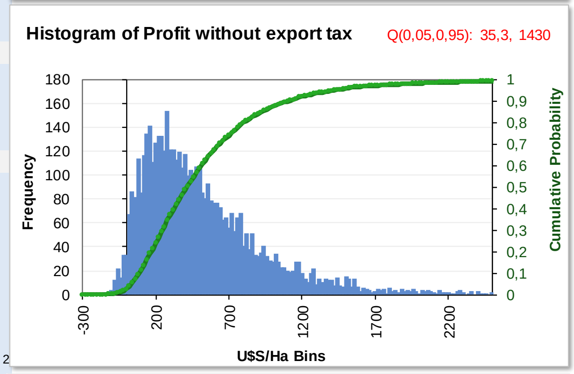
	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-170,559256	-120,86258	35,3086179	-77,206292	90,7222878
Q(1-α/2):	702,942158	678,547273	1432,32999	1174,79263	2900,24617
Sig Digits:	3	3	3	3	3
Q(α/2):	-171	-121	35,3	-77,2	90,7
Q(1-α/2):	703	679	1430	1170	2900
Label:	Q(0,025,0,975): -1	Q(0,025,0,975): -	Q(0,05,0,95): 35,3	Q(0,025,0,975): -	Q(0,025,0,975): 90,7, 2

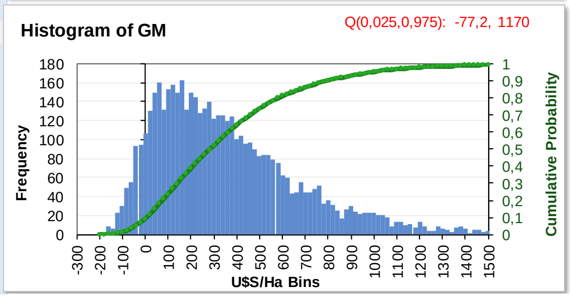
Probabilities

	Profit curent fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-170,559256	-120,86258			
Pr(y>A):	97,50%	97,50%	97,49%	90,68%	99,71%
B:	702,942158	678,547273			
Pr(y<B):	97,50%	97,50%	2,51%	9,32%	0,29%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy Salta *Fitted distributions*

Sample Size (n):	5000	0:11:27	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	-150,66499	-120,84139	130,968916	91,1496564	455,419788
StErr:	1,88520344	1,71465317	4,17104019	1,98919964	6,1705202
Median:	-159,548792	-124,25823	93,2162296	76,5177645	378,505901

Spread

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	133,304014	121,244288	294,93708	140,657656	436,321668
Min:	-520,88122	-471,84633	-423,04282	-224,44581	-210,57044
Max:	285,59441	479,828209	8626,02354	658,360869	13523,9913
Range:	806,47563	951,674542	9049,06637	882,806679	13734,5617

Quartiles

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-253,307076	-214,42573	-20,352419	-15,101121	215,541212
Q(.75):	-55,8765095	-24,057064	225,33387	178,185834	581,113652
IQ Range:	197,430567	190,368668	245,686289	193,286955	365,572441

Shape

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,21925385	0,05013296	7,2975533	0,53748509	8,20808699
Kurtosis:	-0,56786288	-0,6312653	156,26809	0,02596863	182,225146

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-353,82141	-311,94504	-195,87708	-111,53925	47,3026705
Q(.95):	72,3192195	71,6125689	557,427726	344,538045	1095,65116

95% Interval (0.025 and 0.975 Quantiles)

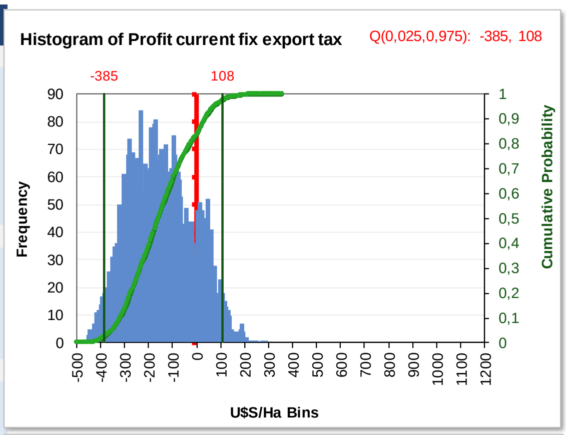
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-385,231583	-336,32493	-240,86017	-136,54164	7,76185151
Q(.975):	107,926254	100,68461	755,135554	393,178005	1389,35731

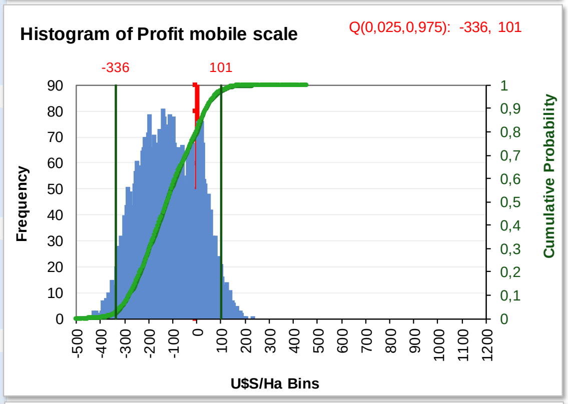
Custom Interval

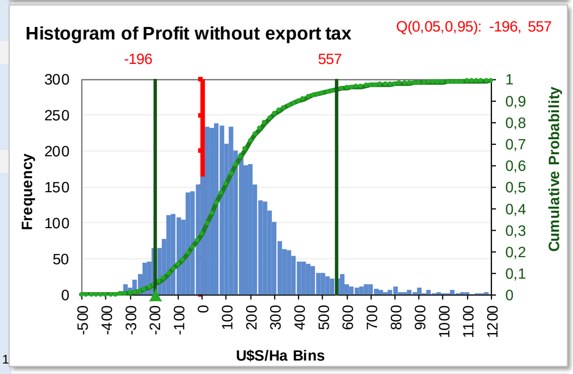
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-385,231583	-336,32493	-195,87708	-136,54164	7,76185151
Q(1-α/2):	107,926254	100,68461	557,427726	393,178005	1389,35731
Sig Digits:	3	3	3	3	3
Q(α/2):	-385	-336	-196	-137	7,76
Q(1-α/2):	108	101	557	393	1390
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -:	Q(0,05,0,95): -19(	Q(0.025,0.975): -:	Q(0.025,0.975): 7.76, 1

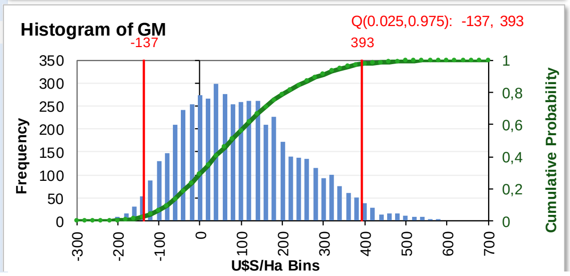
Probabilities

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-385,231583	-336,32493			
Pr(y>A):	97,50%	97,50%	71,64%	70,93%	97,85%
B:	107,926254	100,68461			
Pr(y<B):	97,50%	97,50%	28,36%	29,07%	2,15%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy *Santiago del Estero* *Fitted distributions*

Sample Size (n):	5000	0:12:28	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	-115,200568	-86,102128	176,2601	133,075938	525,68671
StErr:	2,26463294	2,10023377	4,86965175	2,50683209	7,18749209
Median:	-119,524671	-79,50737	133,682912	116,39544	443,82197

Spread

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	160,133731	148,508954	344,336377	177,259797	508,232439
Min:	-726,497153	-711,84721	-708,48825	-540,9912	-451,54718
Max:	410,744191	434,731338	10004,267	848,305022	15627,7637
Range:	1137,24134	1146,57855	10712,7552	1389,29622	16079,3109

Quartiles

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-229,453861	-190,08912	7,86780313	10,7937296	247,381237
Q(.75):	5,96027894	24,4574456	294,186528	242,679012	685,452302
IQ Range:	235,41414	214,546569	286,318725	231,885283	438,071064

Shape

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,00406134	-0,2511827	7,3512468	0,45551754	8,41226481
Kurtosis:	-0,25881794	-0,1244871	164,818271	0,37845078	194,780426

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-371,635204	-337,98378	-221,49282	-129,29842	17,1986663
Q(.95):	139,173357	139,943277	685,592729	448,804975	1286,02794

95% Interval (0.025 and 0.975 Quantiles)

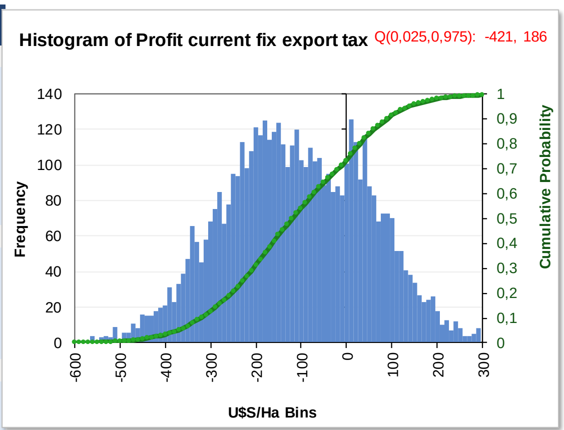
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-420,605176	-387,94124	-291,76537	-173,20192	-53,837729
Q(.975):	186,111708	175,487799	897,248284	524,470281	1623,65939

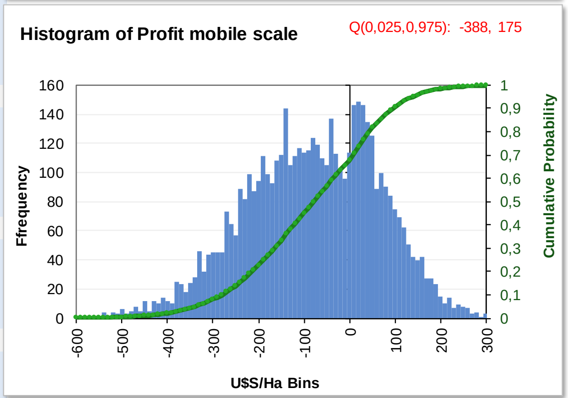
Custom Interval

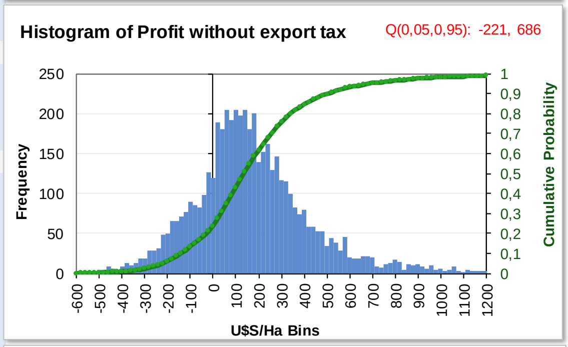
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-420,605176	-387,94124	-221,49282	-173,20192	-53,837729
Q(1-α/2):	186,111708	175,487799	685,592729	524,470281	1623,65939
Sig Digits:	3	3	3	3	3
Q(α/2):	-421	-388	-221	-173	-53,8
Q(1-α/2):	186	175	686	524	1620
Label:	Q(0,025,0,975): -4	Q(0,025,0,975): -:	Q(0,05,0,95): -22:	Q(0,025,0,975): -:	Q(0,025,0,975): -53,8,

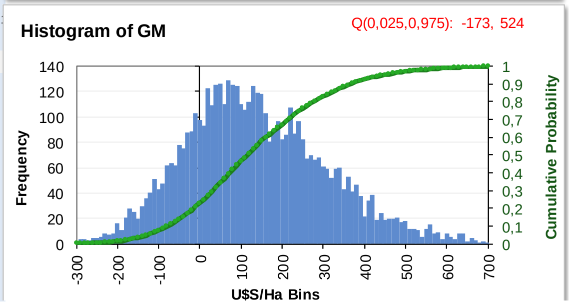
Probabilities

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-420,605176	-387,94124			
Pr(y>A):	97,50%	97,50%	76,29%	77,04%	95,84%
B:	186,111708	175,487799			
Pr(y<B):	97,50%	97,50%	23,71%	22,96%	4,16%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy SE BSAS *Fitted distributions*

		08:23:18 p.m.	0:02:12	08:25:30 p.m.
Sample Size (n):	5000	Run Simulation		
Refresh Interval (ni):	100			
Progress:	100%			
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*		

Central Tendancy (Location)

	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
Mean:	-84,1232954	-56,288615	188,327145	123,92381	494,547186
StErr:	2,13153832	1,91584297	3,81815499	2,31369305	5,6022106
Median:	-85,5782472	-46,773354	146,34965	107,272472	414,832198

Spread

	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
StDev:	150,72252	135,470555	269,984328	163,602804	396,13611
Min:	-616,531235	-587,10931	-547,11679	-351,36019	-296,59818
Max:	536,740032	368,715275	3561,64057	947,5482	5673,58395
Range:	1153,27127	955,824581	4108,75736	1298,90839	5970,18213

Quartiles

	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
Q(.25):	-190,482933	-150,45879	30,4574543	10,706711	245,400125
Q(.75):	25,905604	38,6003368	300,404938	221,754321	650,475042
IQ Range:	216,388537	189,059125	269,947483	211,04761	405,074917

Shape

	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
Skewness:	0,0074516	-0,1949145	2,15856926	0,5874904	2,55530072
Kurtosis:	-0,06653708	-0,0867629	12,2662562	0,81290981	14,7163832

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
Q(.05):	-329,270699	-286,15133	-154,09587	-116,54592	46,6891963
Q(.95):	152,571567	153,285072	631,190979	408,657129	1171,75914

95% Interval (0.025 and 0.975 Quantiles)

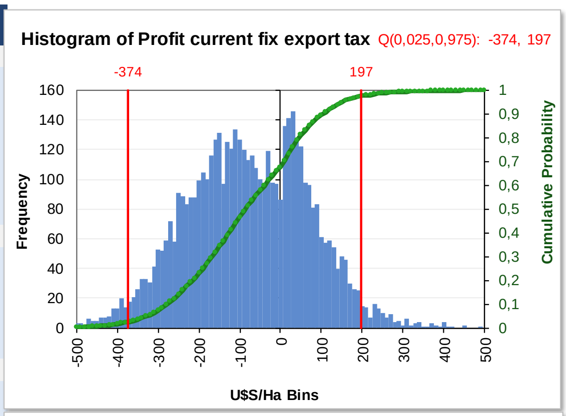
	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
Q(.025):	-374,034492	-326,68968	-221,67757	-162,26347	-1,5050549
Q(.975):	197,42628	190,313629	818,862953	482,653759	1444,1751

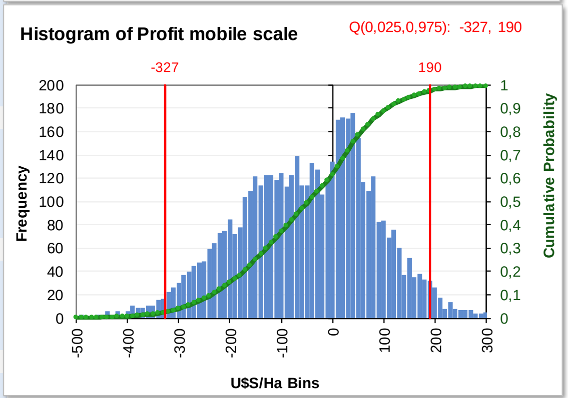
Custom Interval

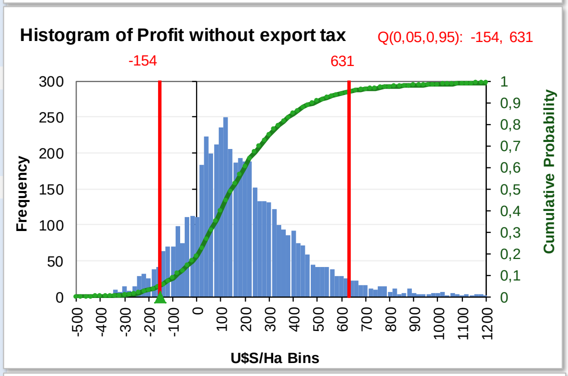
	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-374,034492	-326,68968	-154,09587	-162,26347	-1,5050549
Q(1-α/2):	197,42628	190,313629	631,190979	482,653759	1444,1751
Sig Digits:	3	3	3	3	3
Q(α/2):	-374	-327	-154	-162	-1,51
Q(1-α/2):	197	190	631	483	1440
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -	Q(0,05,0,95): -15	Q(0,025,0,975): -	Q(0,025,0,975): -1,51,

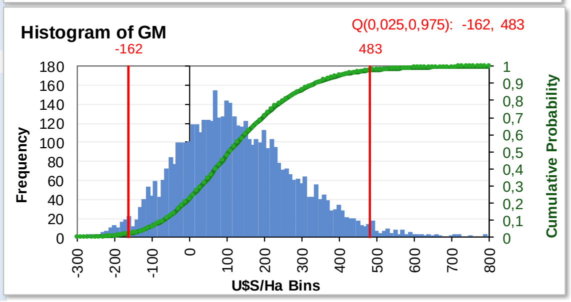
Probabilities

	Profit current fix expo	fit mobile sc	without expo	GM	GM w/o
A:	-374,034492	-326,68968			
Pr(y>A):	97,50%	97,50%	81,20%	77,49%	97,45%
B:	197,42628	190,313629			
Pr(y<B):	97,50%	97,50%	18,80%	22,51%	2,55%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy ***SW BSAS*** ***Fitted distributions***

Sample Size (n):	5000	0:11:28	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	102,056945	126,341853	409,394467	259,535011	723,732286
StErr:	2,10567536	1,95254659	5,17351888	3,06285493	7,94883271
Median:	82,4497045	107,597994	324,365511	220,195334	592,373698

Spread

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	148,893732	138,065893	365,823029	216,576549	562,067351
Min:	-265,377158	-233,27846	-187,43665	-172,12288	-94,062544
Max:	1144,12511	1317,52322	6541,52439	1853,54903	10157,2222
Range:	1409,50227	1550,80168	6728,96103	2025,67192	10251,2848

Quartiles

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	6,06332721	34,4787176	188,201748	102,636316	382,831888
Q(.75):	183,94287	203,003716	531,312431	376,33225	910,744162
IQ Range:	177,879543	168,524998	343,110682	273,695934	527,912274

Shape

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,79529513	1,02403662	3,76914479	1,06883765	3,78626946
Kurtosis:	1,52797039	3,28146301	35,4118929	1,95164569	35,5897056

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-113,378891	-69,809093	49,1915686	-20,065075	168,961095
Q(.95):	369,573902	377,223436	1022,29813	661,92965	1666,09644

95% Interval (0.025 and 0.975 Quantiles)

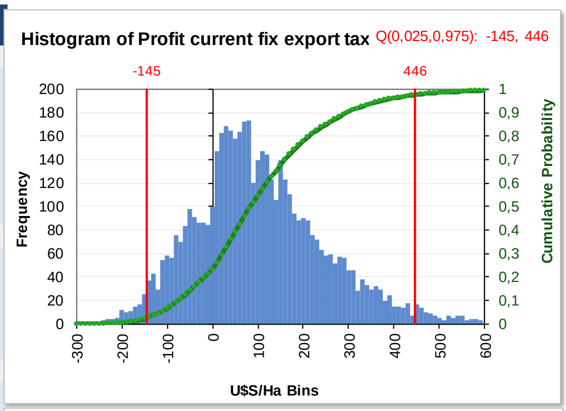
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-145,284742	-101,36936	12,9022648	-51,94912	113,19694
Q(.975):	446,405882	436,436123	1322,11959	780,120891	2127,37489

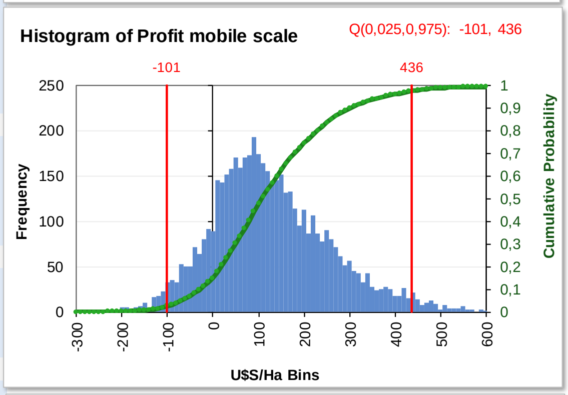
Custom Interval

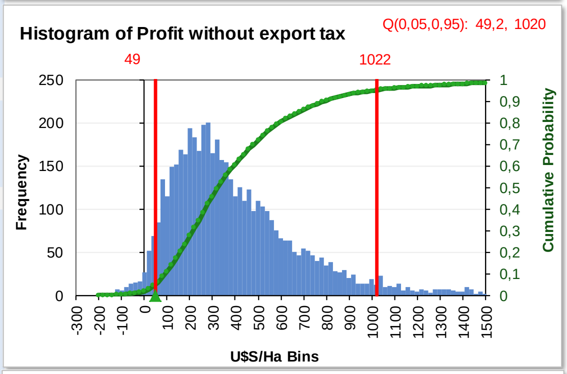
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-145,284742	-101,36936	49,1915686	-51,94912	113,19694
Q(1-α/2):	446,405882	436,436123	1022,29813	780,120891	2127,37489
Sig Digits:	3	3	3	3	3
Q(α/2):	-145	-101	49,2	-51,9	113
Q(1-α/2):	446	436	1020	780	2130
Label:	Q(0,025,0,975): -1	Q(0,025,0,975): -	Q(0,05,0,95): 49,2	Q(0,025,0,975): -	Q(0,025,0,975): 113, 2

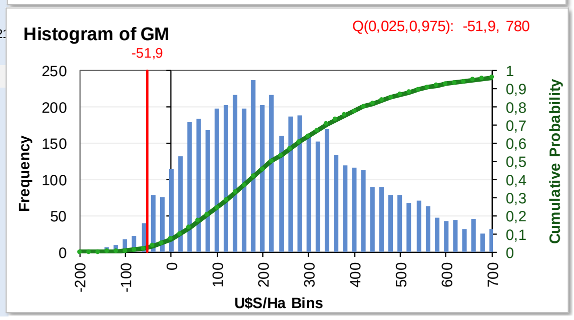
Probabilities

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-145,284742	-101,36936			
Pr(y>A):	97,50%	97,50%	98,09%	92,70%	99,65%
B:	446,405882	436,436123			
Pr(y<B):	97,50%	97,50%	1,91%	7,30%	0,35%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Soy W BS AS Fitted distributions

Sample Size (n):	5000	09:10:58 p.m.	0:11:27
Refresh Interval (ni):	100	Run Simulation	09:22:25 p.m.
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	-28,6712118	35,8096963	476,190091	172,502027	909,59284
StErr:	2,34044556	2,22602322	6,77799817	2,71817362	10,3288171
Median:	-14,3628512	48,8252835	361,23469	158,681993	722,353881

Spread

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	165,494493	157,403611	479,276847	192,2039	730,357664
Min:	-838,598147	-649,51288	-461,99741	-606,86073	-230,25999
Max:	617,126874	607,048717	4868,35853	1093,80524	7686,83086
Range:	1455,72502	1256,56159	5330,35593	1700,66597	7917,09085

Quartiles

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-137,289316	-65,495453	174,191957	39,8034875	449,890445
Q(.75):	80,6437753	143,068463	632,05798	286,707531	1146,98868
IQ Range:	217,933091	208,563916	457,866022	246,904044	697,098234

Shape

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	-0,24991355	-0,4069818	2,18390216	0,41971923	2,25531946
Kurtosis:	0,43491283	0,24854972	7,94859463	0,6581953	8,20345779

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-310,177143	-241,95435	-29,630743	-109,79277	152,338401
Q(.95):	227,420667	277,472014	1399,02458	512,884336	2316,57676

95% Interval (0.025 and 0.975 Quantiles)

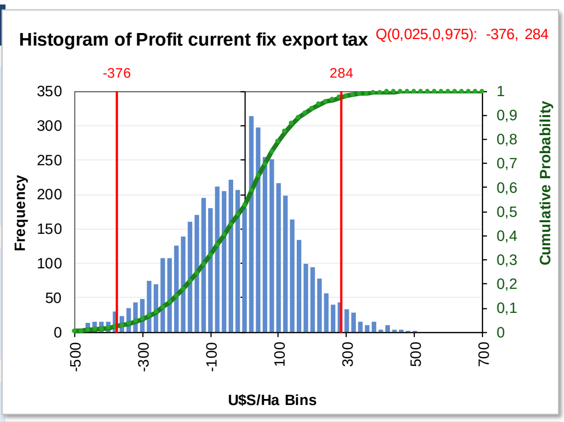
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-375,643869	-303,63905	-101,47335	-173,42578	87,1482946
Q(.975):	284,347989	312,629138	1757,46105	595,314662	2869,75465

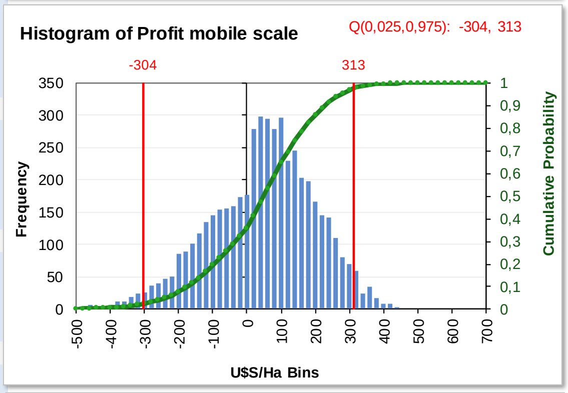
Custom Interval

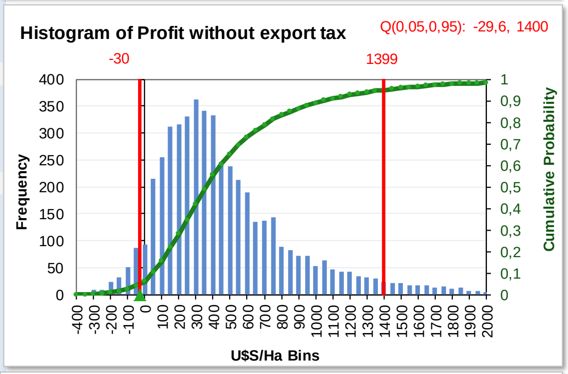
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-375,643869	-303,63905	-29,630743	-173,42578	87,1482946
Q(1-α/2):	284,347989	312,629138	1399,02458	595,314662	2869,75465
Sig Digits:	3	3	3	3	3
Q(α/2):	-376	-304	-29,6	-173	87,1
Q(1-α/2):	284	313	1400	595	2870
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -	Q(0,05,0,95): -29,	Q(0,025,0,975): -	Q(0,025,0,975): 87,1,

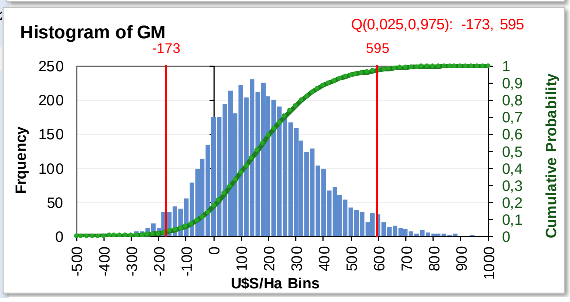
Probabilities

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-375,643869	-303,63905			
Pr(y>A):	97,50%	97,50%	93,89%	82,33%	99,19%
B:	284,347989	312,629138			
Pr(y<B):	97,50%	97,50%	6,11%	17,67%	0,81%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1



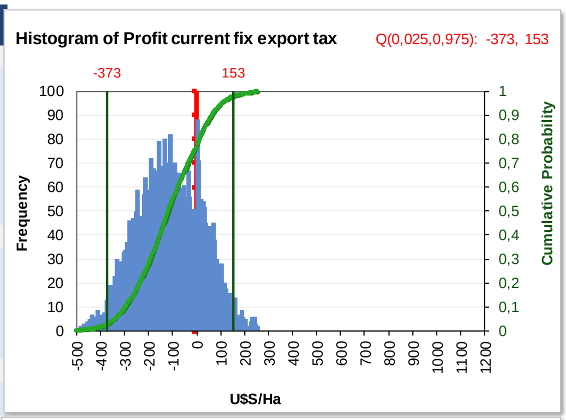


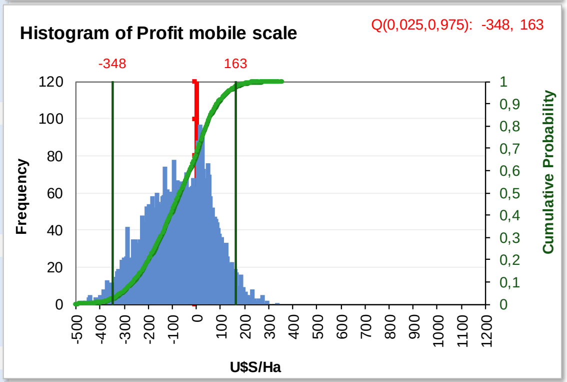


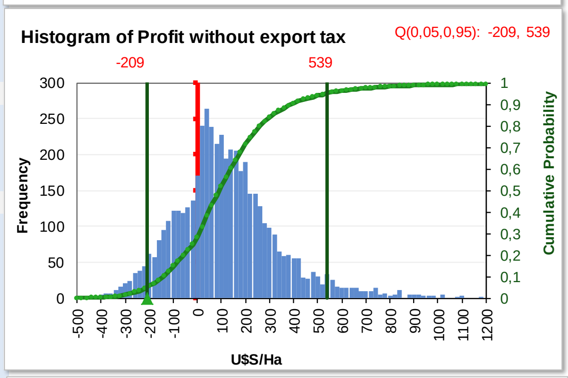


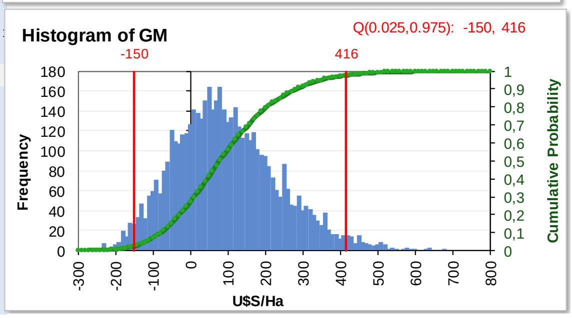
Sunflower ***E La Pampa Fitted distributions***

Sample Size (n):	5000	05:21:57 p.m.	0:11:34	05:33:31 p.m.	
Refresh Interval (ni):	100	Run Simulation			
Progress:	100%				
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*			
Central Tendancy (Location)					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	-112,02983	-76,304603	121,934415	92,5535043	401,893289
StErr:	1,97565538	1,91583153	3,66005437	2,03027587	5,2506845
Median:	-114,732485	-67,158826	91,38351	77,2971063	334,429876
Spread					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	139,699931	135,469747	258,804927	143,562183	371,279462
Min:	-657,462812	-590,81526	-548,65381	-451,38808	-283,14257
Max:	437,633264	334,124068	3584,27085	858,041136	5708,49578
Range:	1095,09608	924,939327	4132,92466	1309,42921	5991,63835
Quartiles					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-211,118955	-170,94364	-19,0454	-7,4620912	174,455844
Q(.75):	-6,85279358	23,2863099	223,261406	178,483916	533,901017
IQ Range:	204,266161	194,229947	242,306806	185,946007	359,445173
Shape					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,03247377	-0,2452335	2,6986224	0,58429942	3,38916419
Kurtosis:	-0,22949917	-0,3227682	20,2217635	0,66611492	26,2420046
90% Interval (0.05 and 0.95 Quantiles)					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-337,665932	-310,14561	-209,03603	-118,93414	-0,7266128
Q(.95):	108,797205	127,649639	538,897093	350,33633	1014,34729
95% Interval (0.025 and 0.975 Quantiles)					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-372,744501	-347,95033	-265,14327	-150,10349	-44,395289
Q(.975):	153,230822	163,241544	708,445549	415,817278	1267,19808
Custom Interval					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-372,744501	-347,95033	-209,03603	-150,10349	-44,395289
Q(1-α/2):	153,230822	163,241544	538,897093	415,817278	1267,19808
Sig Digits:	3	3	3	3	3
Q(α/2):	-373	-348	-209	-150	-44,4
Q(1-α/2):	153	163	539	416	1270
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -:	Q(0,05,0,95): -20!	Q(0.025,0.975): -:	Q(0.025,0.975): -44.4,
Probabilities					
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-372,744501	-347,95033			
Pr(y>A):	97,50%	97,50%	71,68%	72,97%	94,97%
B:	153,230822	163,241544			
Pr(y<B):	97,50%	97,50%	28,32%	27,03%	5,03%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Sunflower ***S SE Cordoba*** ***Fitted distributions***

Sample Size (n):	5000	0:02:32	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Mean:	-83,6441478	-45,835748	184,585068	125,565019	491,988898
StErr:	2,02712651	1,8582429	3,98439732	2,15688361	5,83108802
Median:	-79,7409729	-35,042434	144,959001	112,615448	417,705641

Spread

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
StDev:	143,33949	131,397616	281,739436	152,514703	412,320188
Min:	-500,481445	-491,80621	-454,78748	-266,2501	-221,88019
Max:	415,380815	359,783686	4444,96656	934,690477	7039,53305
Range:	915,86226	851,589896	4899,75404	1200,94058	7261,41324

Quartiles

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Q(.25):	-190,266055	-137,49881	27,8618191	19,1502701	242,281219
Q(.75):	20,1587977	47,877588	292,087026	217,796106	638,924638
IQ Range:	210,424852	185,376398	264,225207	198,645836	396,643419

Shape

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Skewness:	0,0076476	-0,261356	3,34827126	0,57067027	3,91121404
Kurtosis:	-0,27088511	-0,2534624	31,7442718	0,68750368	38,05187

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Q(.05):	-320,194457	-274,30864	-167,73017	-99,664091	45,5354664
Q(.95):	144,983421	156,825015	646,162377	399,697722	1170,70036

95% Interval (0.025 and 0.975 Quantiles)

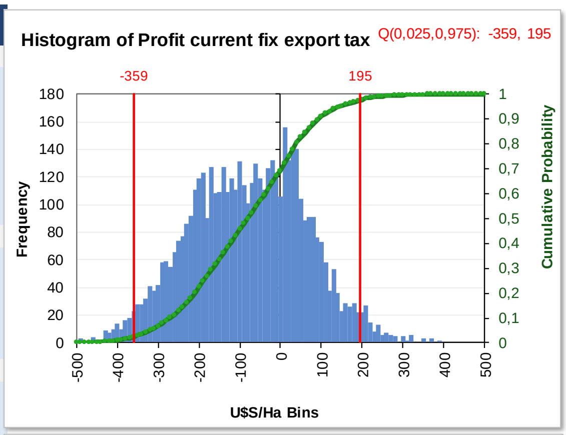
	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Q(.025):	-359,483886	-321,50906	-226,3095	-137,49021	-2,3082537
Q(.975):	194,860432	191,589919	811,556672	459,191731	1452,95597

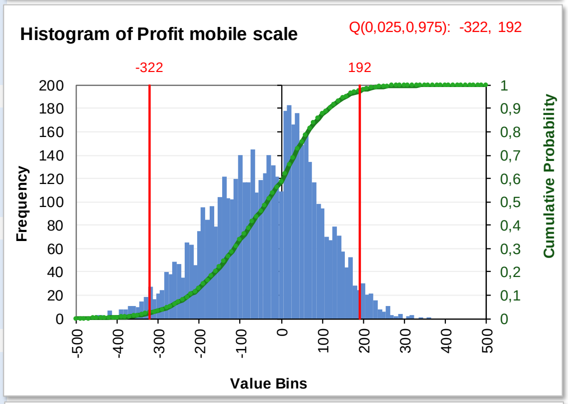
Custom Interval

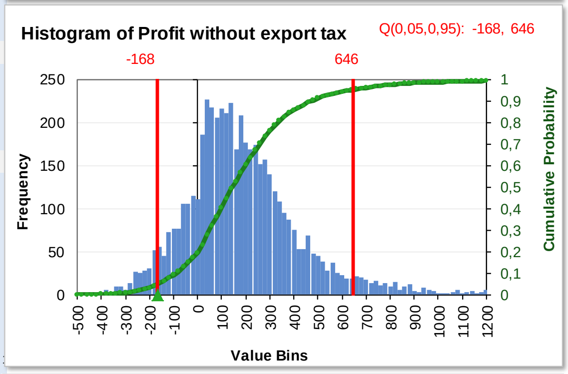
	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-359,483886	-321,50906	-167,73017	-137,49021	-2,3082537
Q(1-α/2):	194,860432	191,589919	646,162377	459,191731	1452,95597
Sig Digits:	3	3	3	3	3
Q(α/2):	-359	-322	-168	-137	-2,31
Q(1-α/2):	195	192	646	459	1450
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -:	Q(0,05,0,95): -16(	Q(0,025,0,975): -:	Q(0,025,0,975): -2,31, :

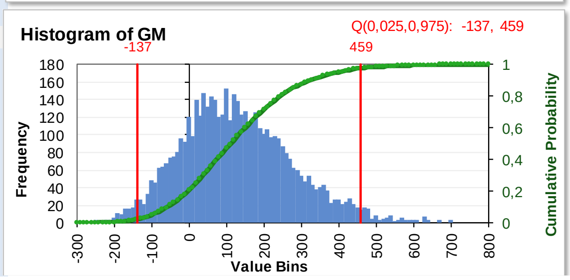
Probabilities

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
A:	-359,483886	-321,50906			
Pr(y>A):	97,50%	97,50%	80,48%	79,49%	97,38%
B:	194,860432	191,589919			
Pr(y<B):	97,50%	97,50%	19,52%	20,51%	2,62%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Sunflower ***SE BS AS*** ***Fitted distributions***

05:34:18 p.m. 0:03:20 05:37:38 p.m.

Sample Size (n):	5000
Refresh Interval (ni):	100
Progress:	100%
Calculate Results:	*VERDADERO*

Run Simulation

Press Esc to force the simulation to stop

Central Tendancy (Location)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	-51,5964318	-15,64786	187,041798	126,62872	458,311206
StErr:	1,96138845	1,86183229	3,79458503	2,18210587	5,5992154
Median:	-47,3025099	2,11675026	147,389434	109,523914	384,691586

Spread

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	138,691108	131,651424	268,317681	154,298185	395,924318
Min:	-535,66426	-450,67039	-412,18239	-247,38024	-180,8271
Max:	734,951683	395,570114	3913,35881	1231,01761	6176,85067
Range:	1270,61594	846,240507	4325,5412	1478,39784	6357,67777

Quartiles

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-147,984877	-105,33067	31,200146	16,4570288	213,150336
Q(.75):	41,1707368	74,4236314	290,500846	214,609536	598,245717
IQ Range:	189,155614	179,7543	259,3007	198,152507	385,095382

Shape

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,08114659	-0,2696949	2,81198333	0,8523917	3,27065742
Kurtosis:	0,18897454	-0,167377	20,1749442	1,57180397	24,0518227

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-278,945217	-249,50398	-143,85745	-89,716963	35,8696795
Q(.95):	167,954331	184,770238	616,213307	404,518476	1096,7655

95% Interval (0.025 and 0.975 Quantiles)

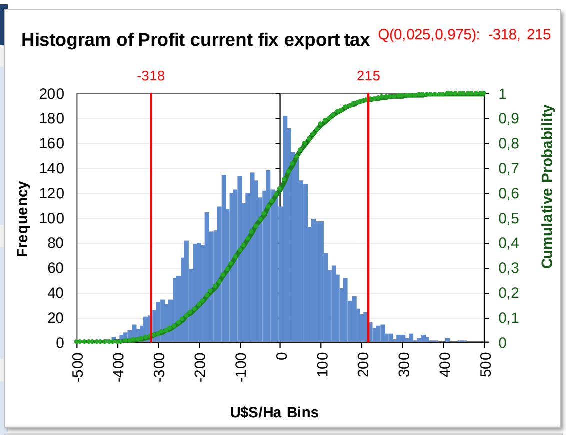
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-318,059933	-286,65782	-193,3484	-116,61302	-9,1071142
Q(.975):	215,111177	220,569777	803,004768	476,704563	1384,46546

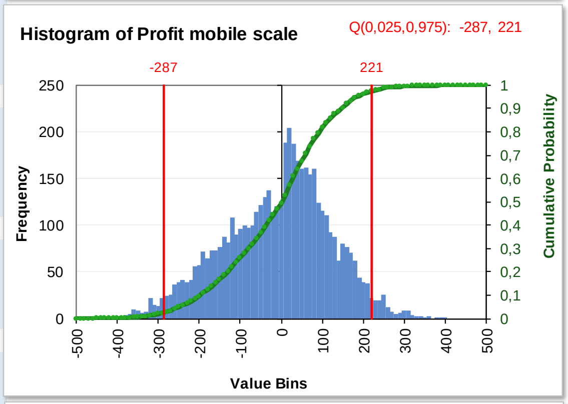
Custom Interval

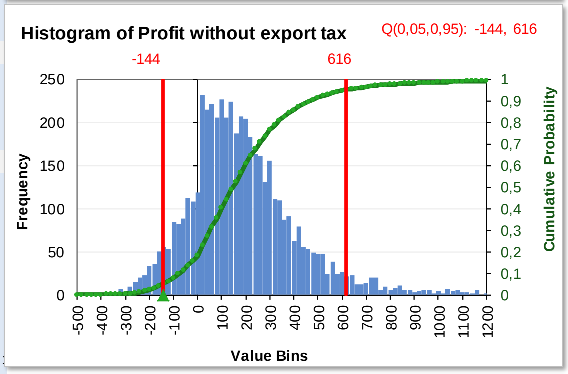
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-318,059933	-286,65782	-143,85745	-116,61302	-9,1071142
Q(1-α/2):	215,111177	220,569777	616,213307	476,704563	1384,46546
Sig Digits:	3	3	3	3	3
Q(α/2):	-318	-287	-144	-117	-9,11
Q(1-α/2):	215	221	616	477	1380
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -	Q(0,05,0,95): -14	Q(0,025,0,975): -	Q(0,025,0,975): -9,11,

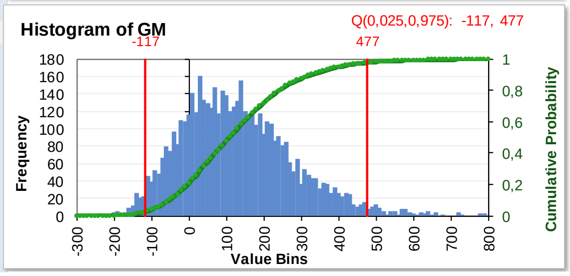
Probabilities

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-318,059933	-286,65782			
Pr(y>A):	97,51%	97,50%	81,88%	79,36%	97,06%
B:	215,111177	220,569777			
Pr(y<B):	97,50%	97,50%	18,12%	20,64%	2,94%
Pr(A<y<B):	95,01%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,0499	0,05	1	1	1









Sunflower ***SW BSAS*** ***Fitted distributions***

Sample Size (n):	5000	02:07:56 p.m. 0:02:31 02:10:27 p.m.	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Mean:	12,7131064	54,7210153	302,160285	222,600574	645,588905
StErr:	1,92152536	1,69029335	4,11585461	2,32742244	6,20791947
Median:	21,3879651	65,0775503	251,611461	208,363734	561,166631

Spread

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
StDev:	135,872361	119,521789	291,03487	164,573619	438,966195
Min:	-404,375319	-355,58809	-313,2368	-203,46565	-135,54904
Max:	1040,76735	522,185076	4858,87383	1706,0714	7744,06927
Range:	1445,14267	877,773165	5172,11064	1909,53705	7879,61831

Quartiles

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Q(.25):	-75,9472578	-14,087356	124,976482	109,243614	376,047428
Q(.75):	96,0600959	136,490803	414,016241	318,611731	807,718565
IQ Range:	172,007354	150,57816	289,039759	209,368116	431,671136

Shape

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Skewness:	0,07921131	-0,4024871	2,84193281	0,8065669	3,05959211
Kurtosis:	1,00392424	0,17492276	21,8920109	2,31371592	24,2794527

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Q(.05):	-223,116843	-162,07426	-30,427489	-16,762326	156,257209
Q(.95):	227,430799	234,735039	802,46032	518,394288	1406,27662

95% Interval (0.025 and 0.975 Quantiles)

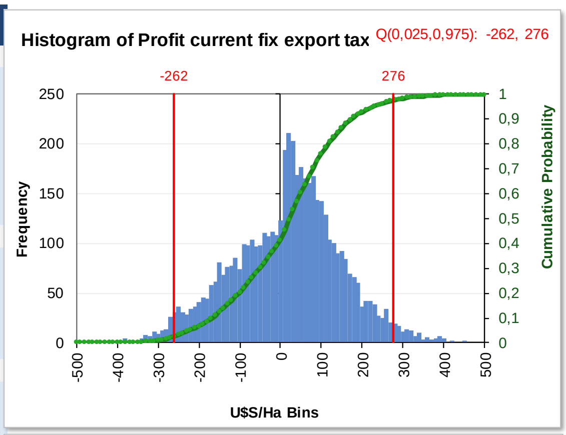
	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Q(.025):	-261,516035	-206,75899	-90,480773	-47,178425	99,8133955
Q(.975):	276,124949	265,596343	1001,15553	585,51105	1715,0415

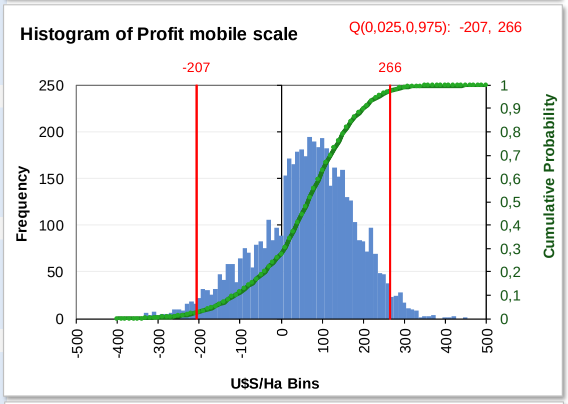
Custom Interval

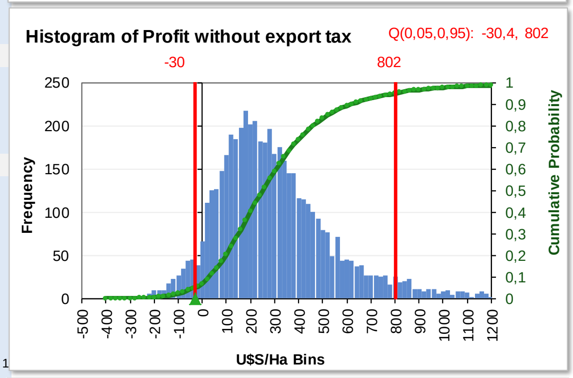
	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-261,516035	-206,75899	-30,427489	-47,178425	99,8133955
Q(1-α/2):	276,124949	265,596343	802,46032	585,51105	1715,0415
Sig Digits:	3	3	3	3	3
Q(α/2):	-262	-207	-30,4	-47,2	99,8
Q(1-α/2):	276	266	802	586	1720
Label:	Q(0,025,0,975): -2	Q(0,025,0,975): -:	Q(0,05,0,95): -30,	Q(0,025,0,975): -4	Q(0,025,0,975): 99,8, 1

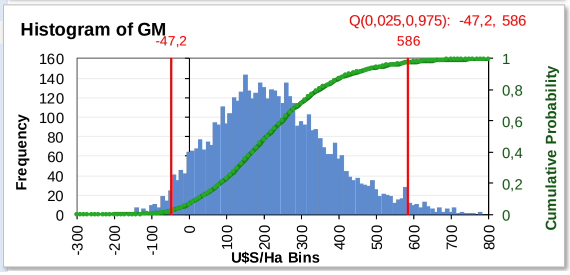
Probabilities

	Profit current fix expo	fit mobile sca	without expo	GM	GM w/o
A:	-261,516035	-206,75899			
Pr(y>A):	97,50%	97,50%	93,21%	93,20%	99,57%
B:	276,124949	265,596343			
Pr(y<B):	97,50%	97,50%	6,79%	6,80%	0,43%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Sunflower ***W BSAS*** ***Fitted distributions***

Sample Size (n):	5000	0:02:34	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Mean:	57,2715343	97,4888203	358,77936	244,523471	692,309154
StErr:	2,16019417	2,05880573	4,88071196	2,83971665	7,39397176
Median:	57,7741061	99,4667589	298,289413	221,606953	596,54209

Spread

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
StDev:	152,748795	145,579549	345,118452	200,79829	522,832757
Min:	-562,37675	-441,98888	-462,38511	-340,6683	-263,44879
Max:	951,155568	750,61839	5004,04149	1588,52118	7852,29502
Range:	1513,53232	1192,60727	5466,4266	1929,18948	8115,74381

Quartiles

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-41,4110693	9,50950234	142,013425	101,857808	359,775848
Q(.75):	146,389306	191,866567	491,908015	357,553242	893,296176
IQ Range:	187,800376	182,357064	349,89459	255,695434	533,520328

Shape

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,19117298	-0,1039709	3,00289242	0,81760343	3,14314286
Kurtosis:	0,93544787	0,38227014	22,2196063	1,56036746	23,3793419

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-192,830084	-148,8761	-19,708328	-36,757714	132,751242
Q(.95):	316,389722	332,718652	926,257003	611,405291	1556,23395

95% Interval (0.025 and 0.975 Quantiles)

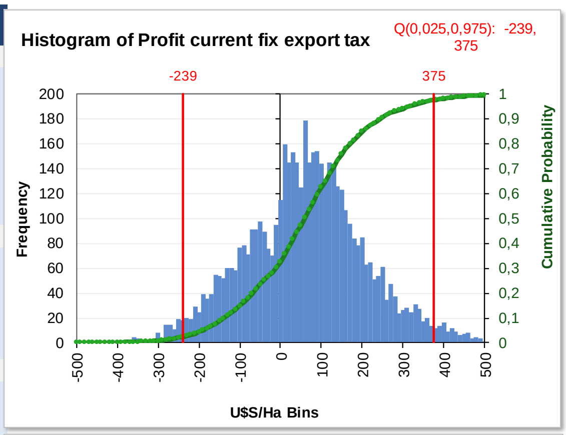
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-239,261	-205,04787	-88,689562	-75,5977	68,9253072
Q(.975):	375,377351	376,757565	1188,01235	703,471144	1944,03471

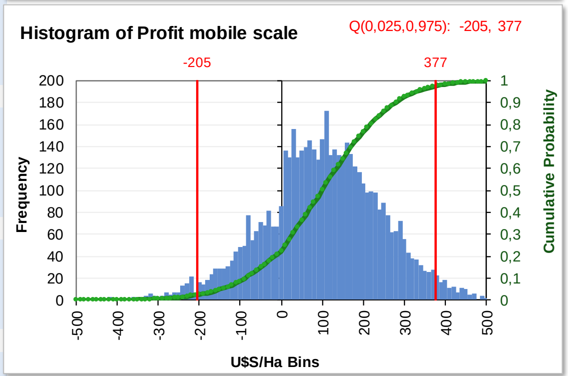
Custom Interval

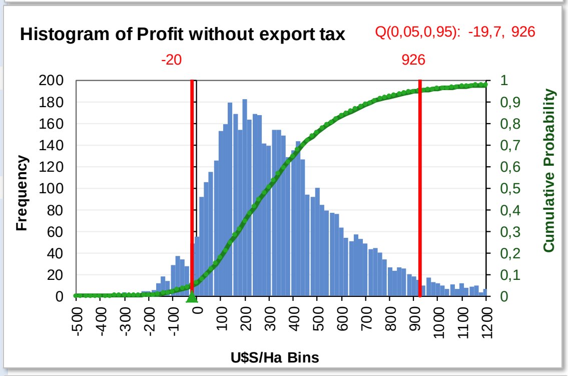
	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-239,261	-205,04787	-19,708328	-75,5977	68,9253072
Q(1-α/2):	375,377351	376,757565	926,257003	703,471144	1944,03471
Sig Digits:	3	3	3	3	3
Q(α/2):	-239	-205	-19,7	-75,6	68,9
Q(1-α/2):	375	377	926	703	1940
Label:	Q(0,025,0,975): -2	Q(0,025,0,975): -	Q(0,05,0,95): -19,	Q(0,025,0,975): -	Q(0,025,0,975): 68,9, 1

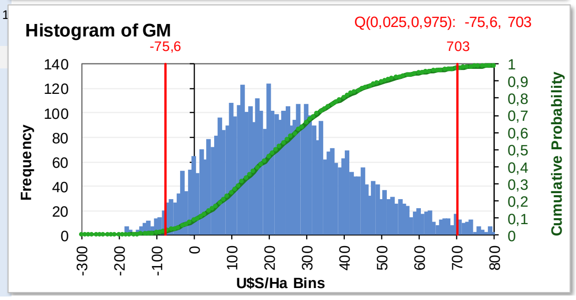
Probabilities

	Profit current fix exp	ofit mobile sca	without expo	GM	GM w/o
A:	-239,261	-205,04787			
Pr(y>A):	97,50%	97,50%	93,92%	91,24%	98,84%
B:	375,377351	376,757565			
Pr(y<B):	97,50%	97,50%	6,08%	8,76%	1,16%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Wheat *E La Pampa* ***Fitted distributions***

10:20:15 p.m. 0:03:13 10:23:28 p.m.

Sample Size (n):	5000
Refresh Interval (ni):	100
Progress:	100%
Calculate Results:	*VERDADERO*

Run Simulation

Press Esc to force the simulation to stop

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Mean:	-227,395857	-157,23338	-48,865781	-32,930345	175,544078
StErr:	1,67132191	1,99893656	3,02558033	1,45029167	3,87654448
Median:	-229,952071	-158,73483	-64,472369	-39,374467	125,084798

Spread

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
StDev:	118,180305	141,34616	213,940837	102,551108	274,113089
Min:	-607,134313	-702,77451	-647,80605	-392,95852	-396,31154
Max:	184,234298	326,68985	3879,28541	389,601811	6210,56604
Range:	791,368611	1029,46436	4527,09147	782,560331	6606,87758

Quartiles

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Q(.25):	-306,194144	-256,50755	-187,62943	-99,994706	10,8544723
Q(.75):	-150,195911	-55,498848	58,1538187	28,5754493	272,490937
IQ Range:	155,998233	201,008707	245,783253	128,570155	261,636465

Shape

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Skewness:	0,06809497	-0,021801	2,61090311	0,30394638	4,48118782
Kurtosis:	-0,07833938	-0,287198	31,5230498	0,37016543	64,0097684

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Q(.05):	-420,685032	-388,45807	-339,11373	-193,54825	-121,64278
Q(.95):	-23,2183123	72,1977293	294,365184	148,70805	632,520027

95% Interval (0.025 and 0.975 Quantiles)

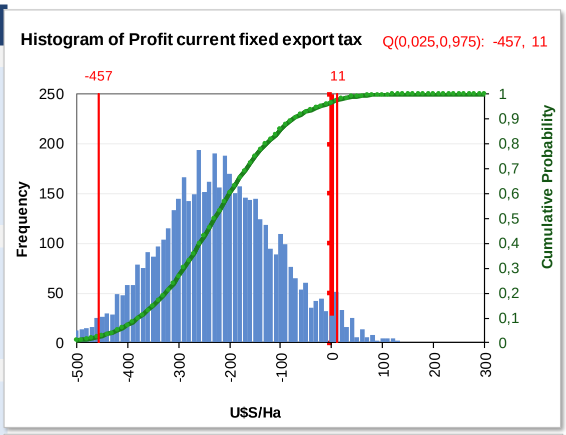
	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Q(.025):	-456,636215	-426,55658	-382,69005	-224,82753	-160,61418
Q(.975):	11,0377104	105,949836	408,39859	189,693384	808,389308

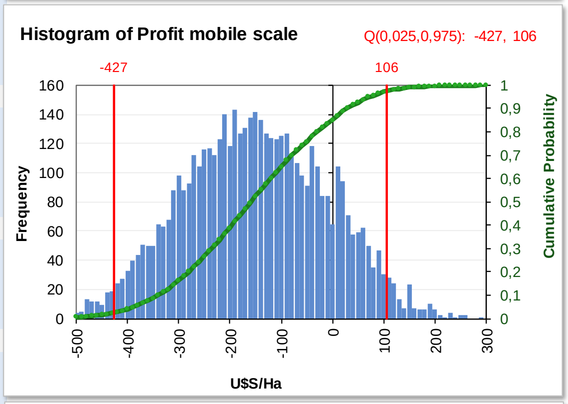
Custom Interval

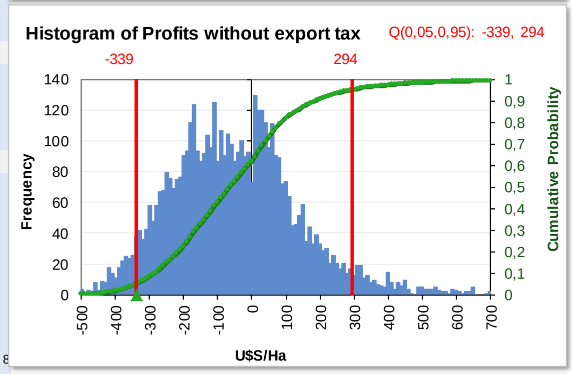
	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-456,636215	-426,55658	-339,11373	-224,82753	-160,61418
Q(1-α/2):	11,0377104	105,949836	294,365184	189,693384	808,389308
Sig Digits:	3	3	3	3	3
Q(α/2):	-457	-427	-339	-225	-161
Q(1-α/2):	11	106	294	190	808
Label:	Q(0,025,0,975): -4	Q(0,025,0,975): -	Q(0,05,0,95): -33	Q(0,025,0,975): -	Q(0,025,0,975): -161, 8

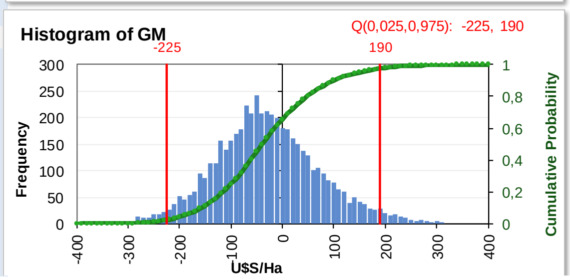
Probabilities

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
A:	-456,636215	-426,55658			
Pr(y>A):	97,50%	97,51%	38,37%	34,43%	77,26%
B:	11,0377104	105,949836			
Pr(y<B):	97,50%	97,50%	61,63%	65,57%	22,74%
Pr(A<y<B):	95,00%	95,01%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,0499	1	1	1









Wheat *N BSAS*

Fitted distributions

Sample Size (n):	5000	0:04:13
Refresh Interval (ni):	100	Run Simulation
Progress:	100%	
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Mean:	-35,6271654	65,0109305	224,37623	85,1696013	455,093164
StErr:	2,19887583	2,64884218	4,60880926	2,67520544	6,84964329
Median:	-28,7839686	61,0605963	168,751447	66,3548902	354,196272

Spread

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
StDev:	155,484001	187,301427	325,892028	189,165591	484,342922
Min:	-624,278113	-662,27142	-534,94394	-561,49115	-483,43111
Max:	577,693321	1137,81244	3401,07426	1012,63436	5350,039
Range:	1201,97143	1800,08386	3936,0182	1574,12551	5833,47011

Quartiles

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-139,32849	-51,174755	27,8997317	-42,424519	141,275813
Q(.75):	63,155669	175,801248	352,626442	192,080816	638,820679
IQ Range:	202,484159	226,976002	324,726711	234,505335	497,544865

Shape

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,04179806	0,24970501	1,98407185	0,65099372	2,25334342
Kurtosis:	0,30558327	0,8486119	8,53844164	1,07560687	9,80289179

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-291,16369	-238,85412	-184,87145	-186,87904	-82,985057
Q(.95):	216,801686	377,927123	813,135086	419,75426	1340,8028

95% Interval (0.025 and 0.975 Quantiles)

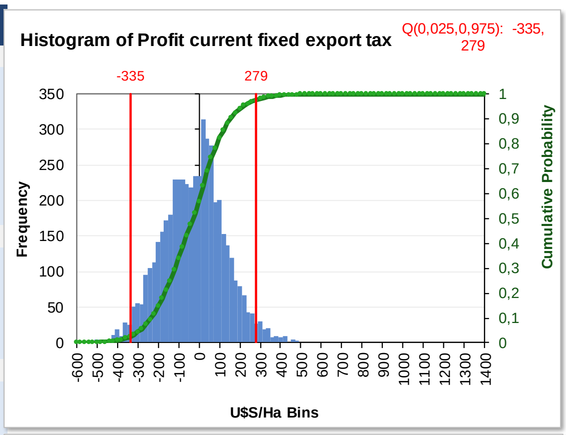
	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-335,407503	-292,3835	-246,26869	-237,11461	-139,30536
Q(.975):	279,466856	464,351495	1020,46284	523,28065	1656,49398

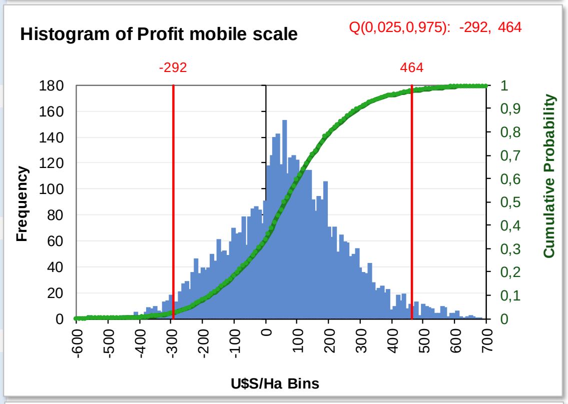
Custom Interval

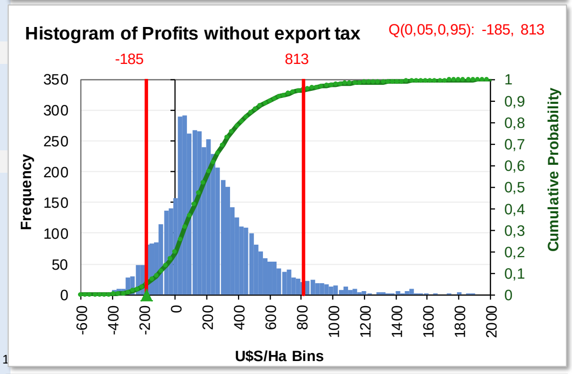
	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-335,407503	-292,3835	-184,87145	-237,11461	-139,30536
Q(1-α/2):	279,466856	464,351495	813,135086	523,28065	1656,49398
Sig Digits:	3	3	3	3	3
Q(α/2):	-335	-292	-185	-237	-139
Q(1-α/2):	279	464	813	523	1660
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -2	Q(0,05,0,95): -18	Q(0,025,0,975): -2	Q(0,025,0,975): -139, 1

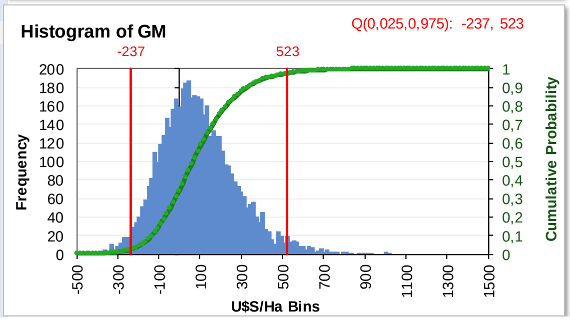
Probabilities

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
A:	-335,407503	-292,3835			
Pr(y>A):	97,50%	97,50%	80,35%	65,79%	89,60%
B:	279,466856	464,351495			
Pr(y<B):	97,50%	97,50%	19,65%	34,21%	10,40%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Wheat *S Santa Fe* — *Fitted distributions*

Sample Size (n):	5000	10:24:56 p.m.	0:03:31
Refresh Interval (ni):	100	Run Simulation	10:28:27 p.m.
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
Mean:	-66,320914	24,5070516	173,742238	48,7630172	380,926621
StErr:	2,2781618	2,80381373	4,82920753	2,79841955	7,16249793
Median:	-73,3267143	22,0328017	114,34806	23,0076575	271,553488

Spread

	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
StDev:	161,090365	198,25957	341,47654	197,878144	506,465085
Min:	-651,405151	-559,10636	-627,10126	-526,08063	-495,81259
Max:	1480,01524	2640,59851	7927,09361	2399,60987	12281,6301
Range:	2131,42039	3199,70487	8554,19487	2925,6905	12777,4426

Quartiles

	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
Q(.25):	-170,578563	-100,40905	-1,701422	-70,09914	98,7452634
Q(.75):	24,1444337	124,63557	278,044509	133,377603	526,588737
IQ Range:	194,722997	225,044621	279,745931	203,476742	427,843473

Shape

	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
Skewness:	1,07432676	1,41028928	5,24667214	2,21569556	5,86290523
Kurtosis:	6,10516639	10,3098062	79,7944604	13,9471799	91,7524321

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
Q(.05):	-306,460614	-272,08793	-203,25455	-203,52093	-101,00145
Q(.95):	187,680934	341,164567	726,762324	378,881772	1204,65735

95% Interval (0.025 and 0.975 Quantiles)

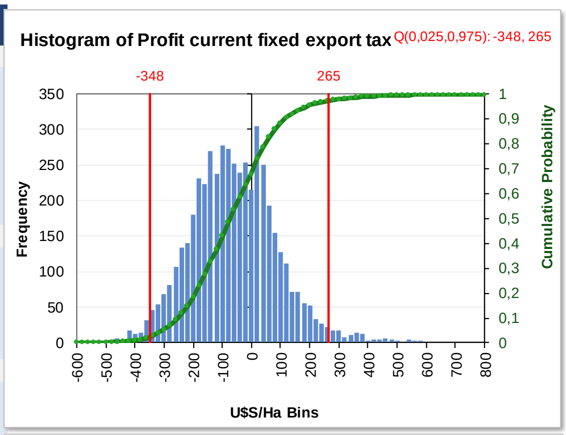
	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
Q(.025):	-348,272752	-315,53394	-262,17309	-246,95875	-154,10577
Q(.975):	264,536188	444,61725	947,974458	504,372955	1561,09188

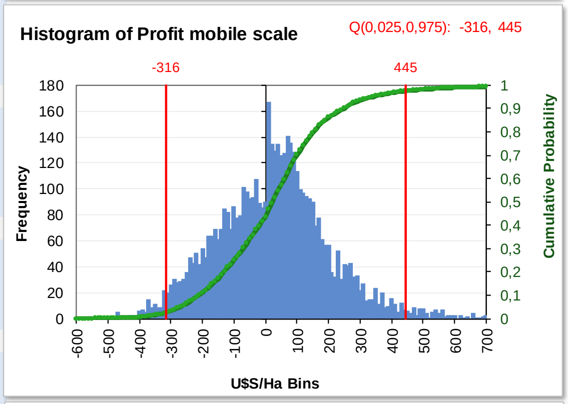
Custom Interval

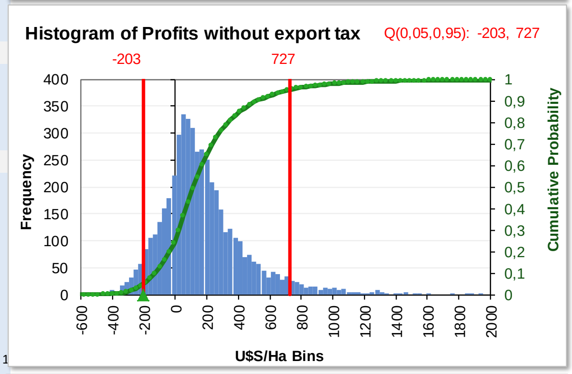
	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-348,272752	-315,53394	-203,25455	-246,95875	-154,10577
Q(1-α/2):	264,536188	444,61725	726,762324	504,372955	1561,09188
Sig Digits:	3	3	3	3	3
Q(α/2):	-348	-316	-203	-247	-154
Q(1-α/2):	265	445	727	504	1560
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -:	Q(0,05,0,95): -20:	Q(0,025,0,975): -:	Q(0,025,0,975): -154, 1

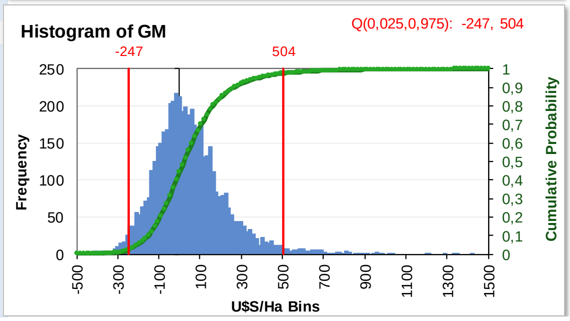
Probabilities

	Profit current fixed ex	ofit mobile scs	without expc	GM	GM w/o
A:	-348,272752	-315,53394			
Pr(y>A):	97,50%	97,50%	74,77%	55,82%	87,09%
B:	264,536188	444,61725			
Pr(y<B):	97,50%	97,50%	25,23%	44,18%	12,91%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Wheat *S SE Cordoba* *Fitted distributions*

Sample Size (n):	5000		0:02:33	
Refresh Interval (ni):	100		Run Simulation	
Progress:	100%			
Calculate Results:	*VERDADERO*		*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Mean:	-102,373779	-26,462056	97,35516	11,2190412	282,683775
StErr:	3,45887208	3,64513507	4,73959387	3,64370255	6,26912029
Median:	-72,4952526	2,57495616	80,3557213	25,0220272	221,965309

Spread

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
StDev:	244,57919	257,749973	335,139896	257,648679	443,293747
Min:	-6823,02735	-6857,3316	-6739,6845	-6723,4941	-6640,1512
Max:	589,773171	707,928434	3196,7257	1032,58384	5048,01132
Range:	7412,80052	7565,26007	9936,41021	7756,0779	11688,1625

Quartiles

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Q(.25):	-173,586273	-116,25659	-47,717338	-70,324633	51,8412375
Q(.75):	17,6464474	96,9730441	221,110824	126,199186	443,367103
IQ Range:	191,23272	213,229632	268,828162	196,523819	391,525866

Shape

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Skewness:	-7,82210162	-6,7610355	-1,7631449	-6,6301983	0,64323096
Kurtosis:	149,057649	126,130981	49,7689199	122,470793	26,1288514

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Q(.05):	-407,848119	-346,42227	-279,83547	-305,93194	-171,54437
Q(.95):	138,837325	261,342152	574,279703	313,510436	980,322772

95% Interval (0.025 and 0.975 Quantiles)

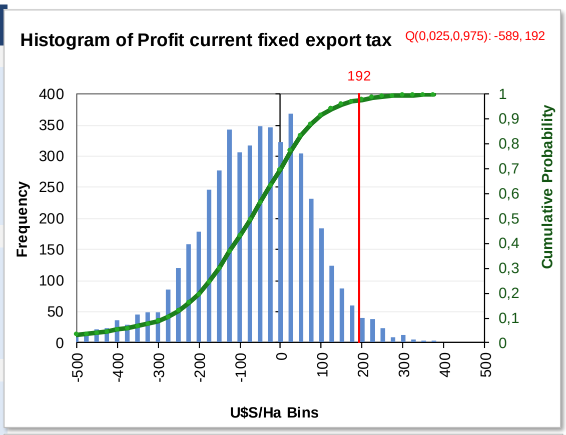
	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Q(.025):	-589,470491	-509,81228	-444,65107	-473,51944	-349,32793
Q(.975):	192,132559	329,999638	774,060831	390,600942	1282,54849

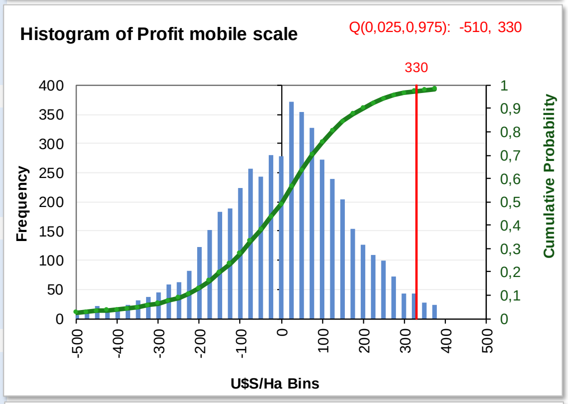
Custom Interval

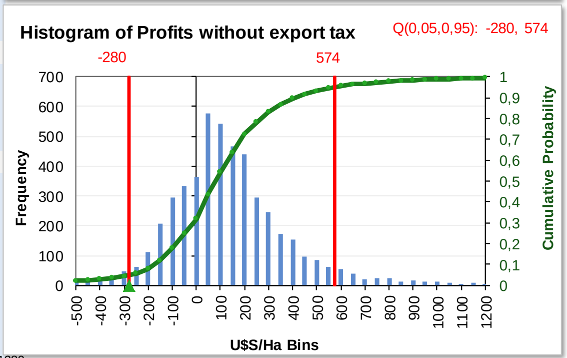
	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-589,470491	-509,81228	-279,83547	-473,51944	-349,32793
Q(1-α/2):	192,132559	329,999638	574,279703	390,600942	1282,54849
Sig Digits:	3	3	3	3	3
Q(α/2):	-589	-510	-280	-474	-349
Q(1-α/2):	192	330	574	391	1280
Label:	Q(0,025,0,975): -5	Q(0,025,0,975): -!	Q(0,05,0,95): -28(	Q(0,025,0,975): -/	Q(0,025,0,975): -349, 1280

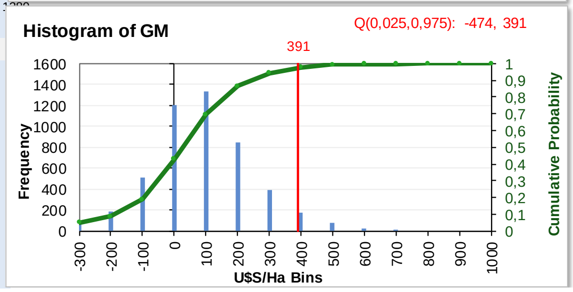
Probabilities

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
A:	-589,470491	-509,81228			
Pr(y>A):	97,50%	97,50%	68,00%	57,11%	82,44%
B:	192,132559	329,999638			
Pr(y<B):	97,50%	97,50%	32,00%	42,89%	17,56%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Wheat *SE BSAS* — *Fitted distributions*

Sample Size (n):	5000	0:02:58	
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Mean:	-336,69392	-215,52935	-40,224347	122,210526	482,416999
StErr:	3,13565192	3,73802099	5,62733949	3,25004375	7,50615451
Median:	-346,518432	-228,55813	-82,528767	106,655472	371,445674

Spread

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
StDev:	221,724074	264,317999	397,912991	229,812798	530,765275
Min:	-2047,67739	-2124,0963	-1965,3411	-1573,8947	-1473,6042
Max:	879,331076	1069,26653	3882,90533	1814,64715	6421,81836
Range:	2927,00846	3193,36278	5848,24648	3388,5418	7895,42253

Quartiles

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Q(.25):	-471,586576	-392,02723	-296,61117	-13,141481	158,211929
Q(.75):	-206,879132	-34,859288	142,126149	245,152052	668,807557
IQ Range:	264,707444	357,167941	438,737324	258,293533	510,595628

Shape

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Skewness:	-0,38742802	-0,1440028	1,65906167	-0,0097212	2,60099936
Kurtosis:	4,05338903	1,93290093	9,35855446	4,97121038	15,3471602

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Q(.05):	-656,046724	-601,54758	-542,88948	-198,30606	-87,39016
Q(.95):	36,6621845	209,603924	629,61133	508,571093	1426,7483

95% Interval (0.025 and 0.975 Quantiles)

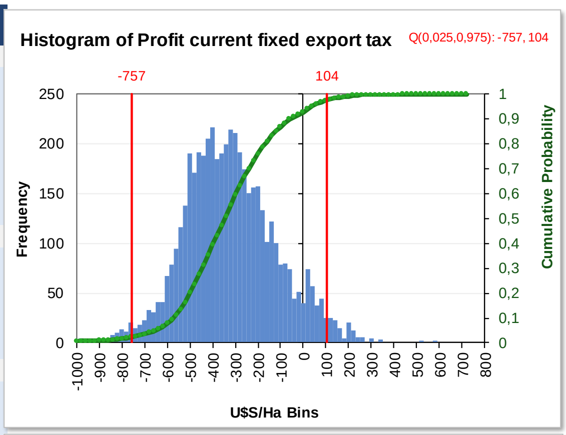
	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Q(.025):	-756,711866	-698,72483	-622,11141	-286,4471	-156,46656
Q(.975):	104,078009	301,780483	829,662178	611,605532	1744,98325

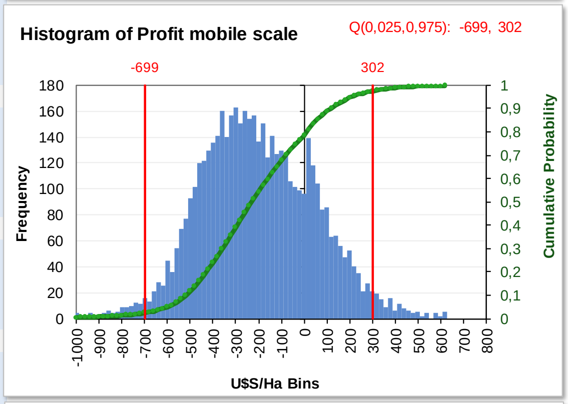
Custom Interval

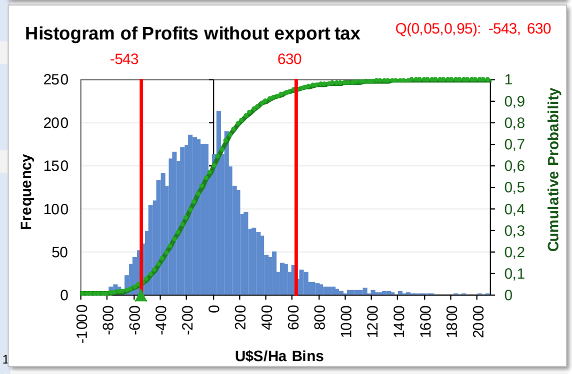
	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-756,711866	-698,72483	-542,88948	-286,4471	-156,46656
Q(1-α/2):	104,078009	301,780483	629,61133	611,605532	1744,98325
Sig Digits:	3	3	3	3	3
Q(α/2):	-757	-699	-543	-286	-156
Q(1-α/2):	104	302	630	612	1740
Label:	Q(0,025,0,975): -7	Q(0,025,0,975): -(	Q(0,05,0,95): -54:	Q(0,025,0,975): -:	Q(0,025,0,975): -156, 1

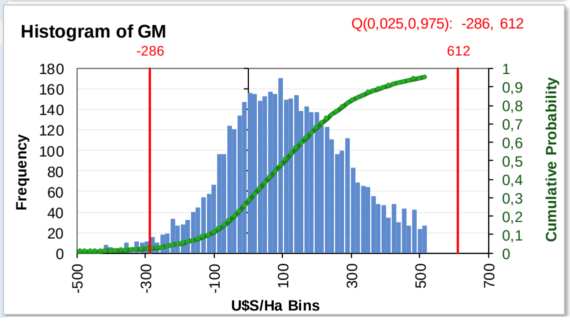
Probabilities

	Profit current fixed ex	ofit mobile sca	without expc	GM	GM w/o
A:	-756,711866	-698,72483			
Pr(y>A):	97,50%	97,50%	41,41%	72,30%	90,16%
B:	104,078009	301,780483			
Pr(y<B):	97,50%	97,50%	58,59%	27,70%	9,84%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Wheat *SW BS AS* *Fitted distributions*

Sample Size (n):	5000	04:36:07 p.m.	0:02:33	04:38:40 p.m.
Refresh Interval (ni):	100	Run Simulation	
Progress:	100%		
Calculate Results:	*VERDADERO*	*Press Esc to force the simulation to stop*	

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Mean:	-5,1372558	81,2766457	227,061213	123,732744	459,760959
StErr:	1,99306112	2,51400342	4,44021386	2,55399114	6,65258327
Median:	-1,3128105	67,8419304	164,676358	99,3131814	352,281161

Spread

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
StDev:	140,930703	177,766887	313,970533	180,594445	470,408674
Min:	-439,772792	-433,13778	-593,73502	-362,87249	-516,83471
Max:	846,938776	988,69117	3434,80559	1442,63812	5314,22386
Range:	1286,71157	1421,82895	4028,54061	1805,5106	5831,05857

Quartiles

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Q(.25):	-102,428185	-35,544012	39,5100455	-0,935135	156,497248
Q(.75):	80,6324191	185,387038	345,599672	224,63806	629,681905
IQ Range:	183,060604	220,93105	306,089626	225,573195	473,184657

Shape

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Skewness:	0,46030973	0,57773323	2,36434318	1,08483404	2,56469338
Kurtosis:	1,17649149	1,14966704	11,64229	2,77815652	12,6567655

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Q(.05):	-227,419999	-192,10759	-139,24385	-121,53681	-36,077282
Q(.95):	230,960183	393,549318	779,078322	454,788882	1309,05001

95% Interval (0.025 and 0.975 Quantiles)

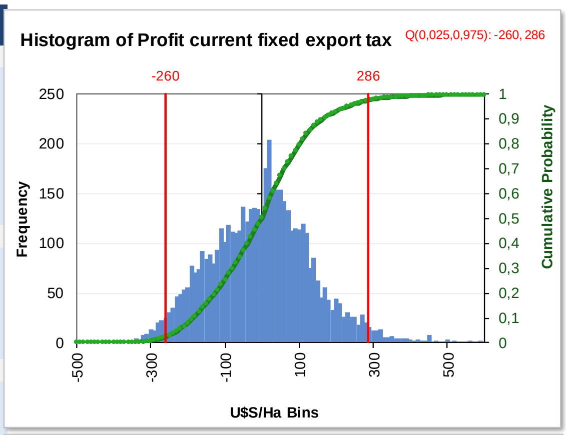
	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Q(.025):	-260,283027	-237,37572	-190,08433	-154,98681	-83,416687
Q(.975):	286,19513	474,020991	994,606286	536,817384	1638,6888

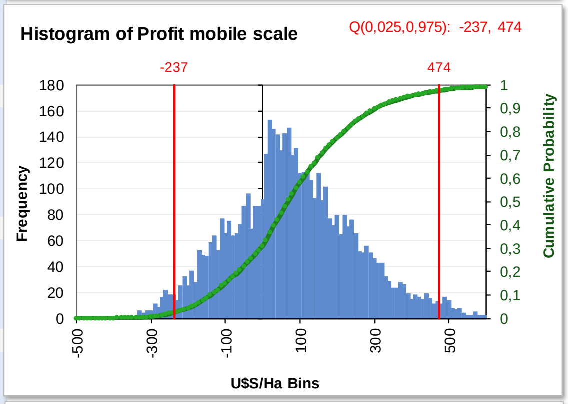
Custom Interval

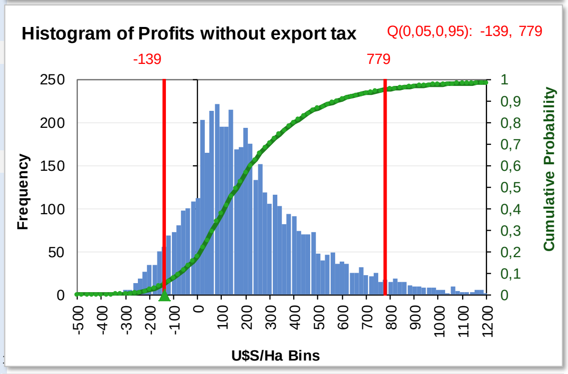
	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-260,283027	-237,37572	-139,24385	-154,98681	-83,416687
Q(1-α/2):	286,19513	474,020991	779,078322	536,817384	1638,6888
Sig Digits:	3	3	3	3	3
Q(α/2):	-260	-237	-139	-155	-83,4
Q(1-α/2):	286	474	779	537	1640
Label:	Q(0,025,0,975): -2	Q(0,025,0,975): -	Q(0,05,0,95): -13	Q(0,025,0,975): -	Q(0,025,0,975): -83,4,

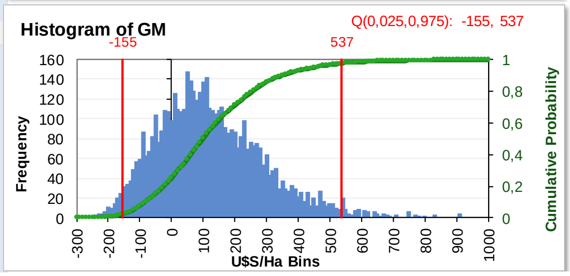
Probabilities

	Profit current fixed ex	ofit mobile sca	without expo	GM	GM w/o
A:	-260,283027	-237,37572			
Pr(y>A):	97,50%	97,50%	82,27%	74,81%	92,52%
B:	286,19513	474,020991			
Pr(y<B):	97,50%	97,50%	17,73%	25,19%	7,48%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









Wheat ***W BS AS*** ***Fitted distributions***

04:43:54 p.m. 0:02:33 04:46:27 p.m.

Sample Size (n):	5000
Refresh Interval (ni):	100
Progress:	100%
Calculate Results:	*VERDADERO*

Run Simulation

Press Esc to force the simulation to stop

Central Tendancy (Location)

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Mean:	-32,1282633	50,7340736	186,732367	85,6713151	396,352651
StErr:	1,91541443	2,27286863	3,97421509	2,3060862	5,89163553
Median:	-25,5600658	46,785074	137,982546	70,0244522	308,813463

Spread

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
StDev:	135,440253	160,716082	281,019444	163,064919	416,601544
Min:	-553,611725	-536,27615	-485,76278	-424,11387	-356,26493
Max:	695,275624	811,389055	2893,28798	1211,24545	4580,91019
Range:	1248,88735	1347,6652	3379,05077	1635,35932	4937,17511

Quartiles

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Q(.25):	-121,779654	-55,559643	26,1740201	-20,507408	136,227344
Q(.75):	55,3714793	146,539425	293,872295	180,397282	544,820938
IQ Range:	177,151133	202,099068	267,698275	200,904689	408,593595

Shape

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Skewness:	0,0217052	0,18161107	2,20188105	0,67013691	2,50580851
Kurtosis:	0,46792829	0,56897222	10,546889	1,47093151	12,0918177

90% Interval (0.05 and 0.95 Quantiles)

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Q(.05):	-257,305528	-208,95217	-162,90123	-153,81711	-60,492482
Q(.95):	184,800122	317,235981	673,083989	376,237817	1122,94613

95% Interval (0.025 and 0.975 Quantiles)

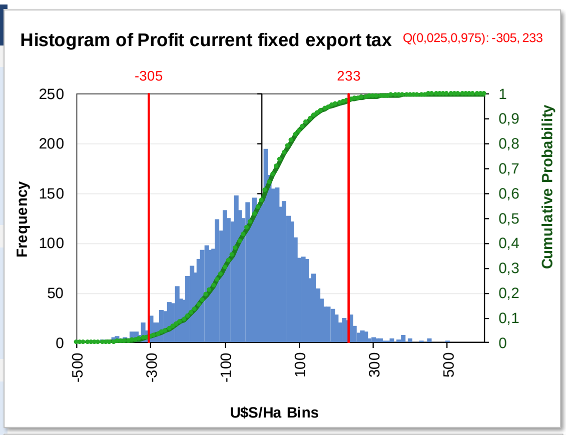
	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Q(.025):	-305,405006	-263,6278	-210,69497	-196,8333	-112,64827
Q(.975):	233,450119	388,982696	852,299455	456,155535	1429,11409

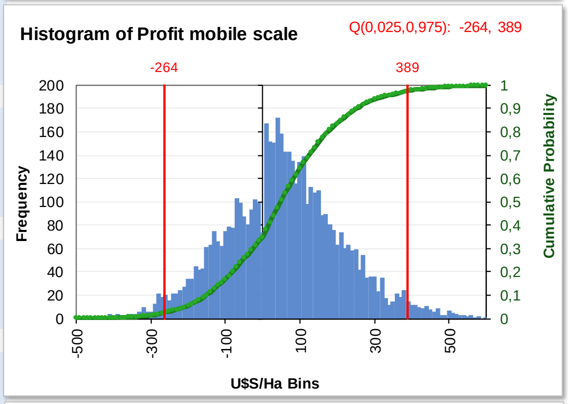
Custom Interval

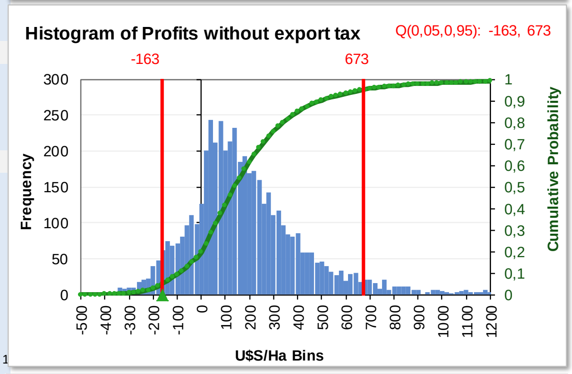
	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
Alpha (α):	0,05	0,05	0,1	0,05	0,05
% Interval:	95%	95%	90%	95%	95%
Q(α/2):	-305,405006	-263,6278	-162,90123	-196,8333	-112,64827
Q(1-α/2):	233,450119	388,982696	673,083989	456,155535	1429,11409
Sig Digits:	3	3	3	3	3
Q(α/2):	-305	-264	-163	-197	-113
Q(1-α/2):	233	389	673	456	1430
Label:	Q(0,025,0,975): -3	Q(0,025,0,975): -2	Q(0,05,0,95): -16	Q(0,025,0,975): -1	Q(0,025,0,975): -113, 1

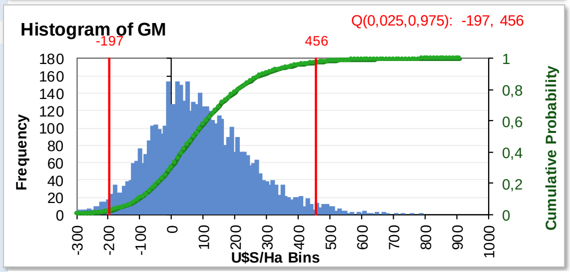
Probabilities

	Profit current fixed ex	ofit mobile sca	s without expo	GM	GM w/o
A:	-305,405006	-263,6278			
Pr(y>A):	97,50%	97,50%	80,35%	69,33%	90,80%
B:	233,450119	388,982696			
Pr(y<B):	97,50%	97,50%	19,65%	30,67%	9,20%
Pr(A<y<B):	95,00%	95,00%	0,00%	0,00%	0,00%
Alpha (α):	0,05	0,05	1	1	1









10.2. Risk measures per region across model

10.2.1. Corn risk measures across regions and models:

Corn with Current Export Taxes								
Statistics		N BSAS	S Santa Fe	S SE Cordoba	S Entre Rios	SE BSAS	SW BSAS	W BSAS
Overall	E(x)	32,92	-133,80	-366,24	-25,46	-149,07	-41,69	-147,77
	St.Dev = σ	225,46	348,70	147,67	237,61	219,28	226,76	271,59
	C.V = σ/E(x)	6,85	-2,61	-0,40	-9,33	-1,47	-5,44	-1,84
LPMs	LPM0	0,40	0,76	0,99	0,50	0,74	0,57	0,68
	LPM1	-72,79	-180,93	-366,98	-101,92	-182,43	-111,14	-190,39
	LPM2	142,71	280,05	394,79	193,51	248,69	178,18	291,86
UPMs	UPM0	0,60	0,237	0,01	0,50	0,26	0,43	0,32
	UPM1	105,71	47,13	0,74	76,46	33,35	69,45	42,62
	UPM2	177,62	247,11	9,09	140,22	91,96	146,32	102,05
Upper / Lower Comparison	UPM1/LPM1	1,45	0,26	0,002	0,75	0,18	0,62	0,22
	UPM2/LPM2	1,24	0,88	0,02	0,72	0,37	0,82	0,35

Corn without Export Taxes								
Statistics		N BSAS	S Santa Fe	S SE Cordoba	S Entre Rios	SE BSAS	SW BSAS	W BSAS
Overall	E(x)	512,92	182,53	-157,82	353,06	243,67	385,15	294,77
	St.Dev = σ	644,66	710,07	271,42	521,96	224,38	638,09	547,50
	C.V = σ/E(x)	1,26	3,89	-1,72	1,48	2,27	1,66	1,86
LPMs	LPM0	0,10	0,34	0,76	0,18	0,28	0,18	0,24
	LPM1	-15,18	-70,19	-204,01	-31,99	-52,27	-28,60	-58,13
	LPM2	64,19	188,00	266,95	116,09	122,27	83,99	156,32
UPMs	UPM0	0,90	0,66	0,24	0,82	0,72	0,82	0,76
	UPM1	528,10	252,72	46,19	385,06	295,94	413,75	352,89
	UPM2	821,31	708,65	165,26	619,37	591,44	740,57	601,84
Upper / Lower Comparison	UPM1/LPM1	34,79	3,60	0,226	12,03	5,66	14,47	6,07
	UPM2/LPM2	12,79	3,77	0,62	5,34	4,84	8,82	3,85

Corn with Mobile Scale Export Taxes								
Statistics		N BSAS	S Santa Fe	S SE Cordoba	S Entre Rios	SE BSAS	SW BSAS	W BSAS
Overall	E(x)	149,95	-21,98	-314,73	112,27	-43,43	62,84	-29,21
	St.Dev = σ	230,18	400,41	153,93	243,09	224,38	235,44	275,18
	C.V = σ/E(x)	1,54	-18,21	-0,49	2,17	-5,17	3,75	-9,42
LPMs	LPM0	0,23	0,57	0,97	0,27	0,55	0,38	0,47
	LPM1	-36,73	-111,64	-316,07	-49,02	-111,99	-63,74	-120,04
	LPM2	99,34	223,40	350,17	139,93	184,98	128,77	229,18
UPMs	UPM0	0,77	0,43	0,03	0,73	0,45	0,62	0,53
	UPM1	186,68	89,66	1,34	161,29	68,57	126,58	90,83
	UPM2	256,12	333,02	11,38	228,29	134,23	206,88	155,08
Upper / Lower Comparison	UPM1/LPM1	5,08	0,80	0,004	3,29	0,61	1,99	0,76
	UPM2/LPM2	2,58	1,49	0,03	1,63	0,73	1,61	0,68

10.2.2. Soybeans risk measures across regions and models**:**

Soy with Current Export Taxes										
Statistics		N BSAS	S Santa Fe	S SE Cordoba	S Entre Rios	SE BSAS	SW BSAS	W BSAS	SALTA	SANTIAGO
Overall distribution	E(x)	68,72	104,47	160,59	-78,81	-84,12	102,06	-28,67	-150,66	-115,20
	St.Dev = σ	175,97	154,00	222,33	147,35	150,71	148,88	165,48	133,29	160,12
	C.V = σ/E(x)	2,56	1,47	1,38	-1,87	-1,79	1,46	-5,77	-0,88	-1,39
LPMs	LPM0	0,32	0,22	0,23	0,68	0,68	0,23	0,53	0,84	0,73
	LPM1	-41,32	-23,23	-20,03	-106,77	-111,27	-17,06	-80,00	-160,40	-137,58
	LPM2	90,97	63,19	50,87	154,38	160,32	43,57	137,34	198,74	188,83
UPMs	UPM0	0,68	0,78	0,77	0,32	0,32	0,77	0,47	0,17	0,27
	UPM1	110,04	127,71	180,62	27,97	27,15	119,12	51,33	9,73	22,38
	UPM2	165,57	175,04	269,50	63,96	63,93	175,16	96,65	31,15	57,01
Upper / Lower Comparison	UPM1/LPM1	2,66	5,50	9,02	0,26	0,24	6,98	0,64	0,06	0,16
	UPM2/LPM2	1,820	2,770	5,298	0,414	0,399	4,020	0,704	0,157	0,302

Soy without Export Taxes										
Statistics		N BSAS	S Santa Fe	S SE Cordoba	S Entre Rios	SE BSAS	SW BSAS	W BSAS	SALTA	SANTIAGO
Overall distribution	E(x)	419,96	492,13	540,27	240,94	188,33	409,39	476,19	130,97	176,26
	St.Dev = σ	377,98	392,87	536,34	343,38	269,96	365,79	479,23	294,91	344,30
	C.V = σ/E(x)	0,90	0,80	0,99	1,43	1,43	0,89	1,01	2,25	1,95
LPMs	LPM0	0,06	0,02	0,03	0,13	0,19	0,02	0,06	0,28	0,24
	LPM1	-5,51	-1,13	-1,21	-15,43	-21,14	-1,04	-6,42	-32,23	-33,97
	LPM2	29,83	11,90	9,70	53,54	62,28	9,58	33,72	74,63	89,97
UPMs	UPM0	0,94	0,99	0,98	0,87	0,81	0,98	0,94	0,72	0,76
	UPM1	425,47	493,26	541,47	256,37	209,47	410,43	482,61	163,20	210,23
	UPM2	564,22	629,60	761,22	416,04	323,21	548,92	674,74	313,93	376,19
Upper / Lower Comparison	UPM1/LPM1	77,25	435,64	448,51	16,62	9,91	395,65	75,15	5,06	6,19
	UPM2/LPM2	18,915	52,901	78,508	7,770	5,190	57,295	20,008	4,207	4,181

Soy with Mobile Scale Export Taxes										
Statistics		N BSAS	S Santa Fe	S SE Cordoba	S Entre Rios	SE BSAS	SW BSAS	W BSAS	SALTA	SANTIAGO
Overall distribution	E(x)	98,18	138,14	184,48	-44,37	-56,29	126,34	35,81	-120,84	-86,10
	St.Dev = σ	156,48	127,10	208,88	128,51	135,46	138,05	157,39	121,23	148,49
	C.V = σ/E(x)	1,59	0,92	1,13	-2,90	-2,41	1,09	4,40	-1,00	-1,72
LPMs	LPM0	0,23	0,12	0,18	0,58	0,62	0,15	0,36	0,80	0,68
	LPM1	-27,39	-10,36	-11,60	-75,39	-85,89	-8,51	-47,25	-130,77	-110,70
	LPM2	71,23	38,83	34,04	121,65	132,71	28,12	99,68	168,64	162,23
UPMs	UPM0	0,77	0,88	0,82	0,42	0,38	0,85	0,64	0,20	0,32
	UPM1	125,58	148,50	196,08	31,02	29,61	134,86	83,06	9,93	24,60
	UPM2	170,45	183,65	276,60	60,70	62,48	185,01	126,95	29,33	56,09
Upper / Lower Comparison	UPM1/LPM1	4,58	14,33	16,91	0,41	0,34	15,84	1,76	0,08	0,22
	UPM2/LPM2	2,393	4,730	8,125	0,499	0,471	6,581	1,274	0,174	0,346

10.2.3. Sunflower risk measures across regions and models:

Sunflower with Current Export Taxes						
Statistics		E La Pampa	SE BSAS	SW BSAS	W BSAS	S SE Cordoba
Overall distribution	E(x)	-112,03	-51,60	12,71	57,27	-83,64
	St.Dev = σ	139,69	138,68	135,86	152,73	143,33
	C.V = σ/E(x)	-1,25	-2,69	10,69	2,67	-1,71
LPMs	LPM0	0,76	0,62	0,41	0,32	0,69
	LPM1	-128,83	-84,46	-47,03	-35,13	-108,22
	LPM2	172,99	129,56	90,36	77,67	155,14
UPMs	UPM0	0,24	0,38	0,59	0,68	0,31
	UPM1	16,80	32,87	59,74	92,40	24,57
	UPM2	46,22	71,47	102,25	143,44	58,91
Upper / Lower Comparison	UPM1/LPM1	0,13	0,39	1,27	2,63	0,23
	UPM2/LPM2	0,27	0,55	1,13	1,85	0,38

Sunflower without Export Taxes						
Statistics		E La Pampa	SE BSAS	SW BSAS	W BSAS	S SE Cordoba
Overall distribution	E(x)	121,93	187,04	302,16	358,78	184,59
	St.Dev = σ	258,78	268,29	291,01	345,08	281,71
	C.V = σ/E(x)	2,12	1,43	0,96	0,96	1,53
LPMs	LPM0	0,28	0,18	0,07	0,06	0,20
	LPM1	-34,85	-18,62	-5,59	-5,28	-22,35
	LPM2	82,51	55,43	27,64	28,69	64,20
UPMs	UPM0	0,72	0,82	0,93	0,94	0,80
	UPM1	156,79	205,66	307,75	364,06	206,93
	UPM2	273,91	322,32	418,59	496,97	330,62
Upper / Lower Comparison	UPM1/LPM1	4,50	11,04	55,07	68,99	9,26
	UPM2/LPM2	3,32	5,81	15,14	17,32	5,15

Sunflower with Mobile Scale Export Taxes						
Statistics		E La Pampa	SE BSAS	SW BSAS	W BSAS	S SE Cordoba
Overall distribution	E(x)	-76,30	-15,65	54,72	97,49	-45,84
	St.Dev = σ	135,46	131,64	119,51	145,56	131,38
	C.V = σ/E(x)	-1,78	-8,41	2,18	1,49	-2,87
LPMs	LPM0	0,67	0,49	0,28	0,22	0,59
	LPM1	-99,24	-60,38	-26,76	-22,02	-77,92
	LPM2	146,69	106,07	63,87	60,11	123,85
UPMs	UPM0	0,33	0,51	0,72	0,78	0,41
	UPM1	22,93	44,73	81,48	119,51	32,09
	UPM2	51,50	79,52	114,88	164,56	63,43
Upper / Lower Comparison	UPM1/LPM1	0,23	0,74	3,05	5,43	0,41
	UPM2/LPM2	0,35	0,75	1,80	2,74	0,51

10.2.4. Wheat risk measures across regions and models:

Wheat with Current Export Taxes								
Statistics		N BSAS	S Santa Fe	S SE Cordoba	E La Pampa	SE BSAS	SW BSAS	W BSAS
Overall distribution	E(x)	-35,63	-66,32	-102,37	-227,40	-336,69	-5,14	-32,13
	St.Dev = σ	155,47	161,07	244,55	118,17	221,70	140,92	135,43
	C.V = σ/E(x)	-4,36	-2,43	-2,39	-0,52	-0,66	-27,43	-4,22
LPMs	LPM0	0,57	0,68	0,70	0,96	0,93	0,503	0,57
	LPM1	-80,48	-100,27	-126,22	-228,64	-343,80	-57,43	-70,43
	LPM2	130,96	146,34	258,34	256,10	401,27	98,49	115,13
UPMs	UPM0	0,43	0,32	0,30	0,04	0,07	0,497	0,43
	UPM1	44,86	33,94	23,84	1,25	7,10	52,30	38,30
	UPM2	91,04	94,48	59,55	9,32	38,66	100,91	78,22
Upper / Lower Comparison	UPM1/LPM1	0,56	0,34	0,19	0,01	0,02	0,91	0,54
	UPM2/LPM2	0,70	0,65	0,23	0,04	0,10	1,02	0,68

Wheat without Export Taxes								
Statistics		N BSAS	S Santa Fe	S SE Cordoba	E La Pampa	SE BSAS	SW BSAS	W BSAS
Overall distribution	E(x)	224,38	173,74	97,36	-48,87	-40,22	227,06	186,73
	St.Dev = σ	325,86	341,44	335,11	213,92	397,87	313,94	280,99
	C.V = σ/E(x)	1,45	1,97	3,44	-4,38	-9,89	1,38	1,50
LPMs	LPM0	0,20	0,24	0,32	0,62	0,57	0,18	0,20
	LPM1	-24,62	-31,25	-59,71	-105,73	-165,70	-18,06	-22,09
	LPM2	69,40	79,30	205,71	159,54	263,35	53,89	62,76
UPMs	UPM0	0,80	0,76	0,68	0,38	0,43	0,82	0,80
	UPM1	249,00	204,99	157,07	56,86	125,47	245,12	208,82
	UPM2	389,50	374,81	281,88	150,65	300,94	383,68	331,49
Upper / Lower Comparison	UPM1/LPM1	10,11	6,56	2,63	0,54	0,76	13,57	9,45
	UPM2/LPM2	5,61	4,73	1,37	0,94	1,14	7,12	5,28

Wheat with Mobile Scale Export Taxes								
Statistics		N BSAS	S Santa Fe	S SE Cordoba	E La Pampa	SE BSAS	SW BSAS	W BSAS
Overall distribution	E(x)	65,01	24,51	-26,46	-157,23	-215,53	81,28	50,73
	St.Dev = σ	187,28	198,24	257,72	141,33	264,29	177,75	160,70
	C.V = σ/E(x)	2,88	8,09	-9,74	-0,90	-1,23	2,19	3,17
LPMs	LPM0	0,34	0,43	0,49	0,85	0,78	0,31	0,35
	LPM1	-44,41	-60,40	-88,40	-166,36	-246,36	-33,93	-40,19
	LPM2	96,26	113,09	232,64	209,12	328,59	75,10	85,36
UPMs	UPM0	0,66	0,57	0,51	0,15	0,22	0,69	0,65
	UPM1	109,42	84,91	61,94	9,12	30,83	115,21	90,93
	UPM2	173,31	164,65	114,02	31,06	91,26	180,44	145,30
Upper / Lower Comparison	UPM1/LPM1	2,46	1,41	0,70	0,05	0,13	3,40	2,26
	UPM2/LPM2	1,80	1,46	0,49	0,15	0,28	2,40	1,70

10.3. Risk measure results for simulations with fitted distributions and with normality assumptions

10.3.1. Corn Statistics

Corn N BSAS	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	32,92	149,95	512,92	37,67	137,19	487,27
Stdev	225,46	230,18	644,66	223,88	265,46	492,35
LPM0= Prob(π<0)	0,40	0,23	0,10	0,40	0,25	0,13
LPM1=E(π / π<0)	-72,79	-36,73	-15,18	-71,15	-54,09	-32,16
LPM2= $(Var(\pi / \pi<0))^{0,5}$	142,71	99,34	64,19	140,37	140,34	114,40
UPM0= Prob(π>0)	0,60	0,77	0,90	0,60	0,75	0,87
UPM1=E(π / π>0)	105,71	186,68	528,10	108,82	191,28	519,44
UPM2= $(Var(\pi / \pi>0))^{0,5}$	177,62	256,12	821,31	178,43	263,81	683,20
CV = σ/μ	6,85	1,54	1,26	5,94	1,94	1,01
Ratio +E(π)/-E(π) = UPM1/LPM1	-1,45	-5,08	-34,79	-1,53	-3,54	-16,15
Ratio +V(π)/-V(π) = UPM2/LPM2	1,24	2,58	12,79	1,27	1,88	5,97
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,51	-0,37	-0,24	-0,51	-0,39	-0,28
Ratio -E(π)/-V(π) = UPM1/UPM2	0,60	0,73	0,64	0,61	0,73	0,76

Corn S SE Cordoba	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-366,24	-314,73	-157,82	-366,68	-320,03	-165,20
Stdev	147,67	153,93	271,42	151,12	164,93	245,10
LPM0= Prob(π<0)	0,99	0,97	0,76	0,99	0,97	0,73
LPM1=E(π / π<0)	-366,98	-316,07	-204,01	-367,19	-321,64	-203,16
LPM2= $(Var(\pi / \pi<0))^{0,5}$	394,79	350,17	266,95	396,56	359,82	278,79
UPM0= Prob(π>0)	0,01	0,03	0,24	0,01	0,03	0,28
UPM1=E(π / π>0)	0,74	1,34	46,19	0,50	1,60	37,96
UPM2= $(Var(\pi / \pi>0))^{0,5}$	9,09	11,38	165,26	6,03	12,23	98,21
CV = σ/μ	-0,40	-0,49	-1,72	-0,41	-0,52	-1,48
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,00	-0,00	-0,23	-0,00	-0,00	-0,19
Ratio +V(π)/-V(π) = UPM2/LPM2	0,02	0,03	0,62	0,02	0,03	0,35
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,93	-0,90	-0,76	-0,93	-0,89	-0,73
Ratio -E(π)/-V(π) = UPM1/UPM2	0,08	0,12	0,28	0,08	0,13	0,39

Corn S Santa Fe	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-133,80	-21,98	182,53	-193,43	-130,02	73,60
Stdev	348,70	400,41	710,07	223,60	257,44	401,64
LPM0= Prob(π<0)	0,76	0,57	0,34	0,79	0,65	0,41
LPM1=E(π / π<0)	-180,93	-111,64	-70,19	-216,86	-178,81	-123,07
LPM2= $(Var(\pi / \pi<0))^{0,5}$	280,05	223,40	188,00	288,03	268,02	234,38
UPM0= Prob(π>0)	0,24	0,43	0,66	0,21	0,35	0,59
UPM1=E(π / π>0)	47,13	89,66	252,72	23,43	48,80	196,67
UPM2= $(Var(\pi / \pi>0))^{0,5}$	247,11	333,02	708,65	66,70	106,51	334,36
CV = σ/μ	-2,61	-18,21	3,89	-1,16	-1,98	5,46
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,26	-0,80	-3,60	-0,11	-0,27	-1,60
Ratio +V(π)/-V(π) = UPM2/LPM2	0,88	1,49	3,77	0,23	0,40	1,43
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,65	-0,50	-0,37	-0,75	-0,67	-0,53
Ratio -E(π)/-V(π) = UPM1/UPM2	0,19	0,27	0,36	0,35	0,46	0,59

Corn S Entre Rios	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-25,46	112,27	353,06	-108,76	-22,34	244,30
Stdev	237,61	243,09	521,96	211,13	246,23	419,40
LPM0= Prob(π<0)	0,50	0,27	0,18	0,66	0,48	0,26
LPM1=E(π / π<0)	-101,92	-49,02	-31,99	-148,75	-108,80	-66,24
LPM2= $(Var(\pi / \pi<0))^{0,5}$	193,51	139,93	116,09	219,49	196,21	160,77
UPM0= Prob(π>0)	0,50	0,73	0,82	0,34	0,52	0,74
UPM1=E(π / π>0)	76,46	161,29	385,06	39,99	86,45	310,54
UPM2= $(Var(\pi / \pi>0))^{0,5}$	140,22	228,29	619,37	90,71	150,43	457,97
CV = σ/μ	-9,33	2,17	1,48	-1,94	-11,02	1,72
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,75	-3,29	-12,03	-0,27	-0,79	-4,69
Ratio +V(π)/-V(π) = UPM2/LPM2	0,72	1,63	5,34	0,41	0,77	2,85
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,53	-0,35	-0,28	-0,68	-0,55	-0,41
Ratio -E(π)/-V(π) = UPM1/UPM2	0,55	0,71	0,62	0,44	0,57	0,68

Corn SE BS AS	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-149,07	-43,43	243,67	-158,87	-69,51	198,73
Stdev	219,28	224,38	552,60	220,76	251,16	421,95
LPM0= Prob(π<0)	0,74	0,55	0,28	0,74	0,55	0,30
LPM1=E(π / π<0)	-182,43	-111,99	-52,27	-189,45	-136,64	-80,36
LPM2= $(Var(\pi / \pi<0))^{0,5}$	248,69	184,98	122,27	260,31	227,67	184,32
UPM0= Prob(π>0)	0,26	0,45	0,72	0,26	0,45	0,70
UPM1=E(π / π>0)	33,35	68,57	295,94	30,57	67,13	279,10
UPM2= $(Var(\pi / \pi>0))^{0,5}$	91,96	134,23	591,44	78,83	126,81	428,45
CV = σ/μ	-1,47	-5,17	2,27	-1,39	-3,61	2,12
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,18	-0,61	-5,66	-0,16	-0,49	-3,47
Ratio +V(π)/-V(π) = UPM2/LPM2	0,37	0,73	4,84	0,30	0,56	2,32
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,73	-0,61	-0,43	-0,73	-0,60	-0,44
Ratio -E(π)/-V(π) = UPM1/UPM2	0,36	0,51	0,50	0,39	0,53	0,65

Corn SW BSAS	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-41,69	62,84	385,15	-53,55	40,03	335,45
Stdev	226,76	235,44	638,09	226,45	259,80	461,45
LPM0= Prob(π<0)	0,57	0,38	0,18	0,56	0,37	0,21
LPM1=E(π / π<0)	-111,14	-63,74	-28,60	-119,14	-84,09	-52,05
LPM2= $(Var(\pi / \pi<0))^{0,5}$	178,18	128,77	83,99	193,18	175,06	144,83
UPM0= Prob(π>0)	0,43	0,62	0,82	0,44	0,63	0,79
UPM1=E(π / π>0)	69,45	126,58	413,75	65,59	124,12	387,50
UPM2= $(Var(\pi / \pi>0))^{0,5}$	146,32	206,88	740,57	129,72	196,09	551,80
CV = σ/μ	-5,44	3,75	1,66	-4,23	6,49	1,38
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,62	-1,99	-14,47	-0,55	-1,48	-7,45
Ratio +V(π)/-V(π) = UPM2/LPM2	0,82	1,61	8,82	0,67	1,12	3,81
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,62	-0,49	-0,34	-0,62	-0,48	-0,36
Ratio -E(π)/-V(π) = UPM1/UPM2	0,47	0,61	0,56	0,51	0,63	0,70

Corn W BSAS	Fitted distributions			*Normality assumption*		
	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-147,77	-29,21	294,77	-18,38	75,43	384,21
Stdev	271,59	275,18	547,50	209,71	243,68	433,84
LPM0= Prob(π<0)	0,68	0,47	0,24	0,50	0,31	0,16
LPM1=E(π / π<0)	-190,39	-120,04	-58,13	-92,62	-65,27	-35,51
LPM2= $(Var(\pi / \pi<0))^{0,5}$	291,86	229,18	156,32	160,87	149,41	115,02
UPM0= Prob(π>0)	0,32	0,53	0,76	0,50	0,69	0,84
UPM1=E(π / π>0)	42,62	90,83	352,89	74,25	140,70	419,72
UPM2= $(Var(\pi / \pi>0))^{0,5}$	102,05	155,08	601,84	135,78	206,76	567,98
CV = σ/μ	-1,84	-9,42	1,86	-11,41	3,23	1,13
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,22	-0,76	-6,07	-0,80	-2,16	-11,82
Ratio +V(π)/-V(π) = UPM2/LPM2	0,35	0,68	3,85	0,84	1,38	4,94
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,65	-0,52	-0,37	-0,58	-0,44	-0,31
Ratio -E(π)/-V(π) = UPM1/UPM2	0,42	0,59	0,59	0,55	0,68	0,74

10.3.2. Soybeans Statistics

Soy	Fitted distributions			*Normality Assumption*		
N BS AS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	68,72	98,18	419,96	75,09	88,92	419,85
Stdev	175,97	156,48	377,98	172,87	178,99	357,34
LPM0= Prob(π<0)	0,32	0,23	0,06	0,29	0,25	0,09
LPM1=E(π / π<0)	-41,32	-27,39	-5,51	-37,31	-36,70	-15,12
LPM2= (Var(π / π<0))^0,5	90,97	71,23	29,83	87,42	96,87	68,54
UPM0= Prob(π>0)	0,68	0,77	0,94	0,71	0,75	0,91
UPM1=E(π / π>0)	110,04	125,58	425,47	112,41	125,62	434,97
UPM2= (Var(π / π>0))^0,5	165,57	170,45	564,22	166,98	174,81	547,06
CV = σ/μ	2,56	1,59	0,90	2,30	2,01	0,85
Ratio +E(π)/-E(π) = UPM1/LPM1	-2,66	-4,58	-77,25	-3,01	-3,42	-28,77
Ratio +V(π)/-V(π) = UPM2/LPM2	1,82	2,39	18,92	1,91	1,80	7,98
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,45	-0,38	-0,18	-0,43	-0,38	-0,22
Ratio -E(π)/-V(π) = UPM1/UPM2	0,66	0,74	0,75	0,67	0,72	0,80

Soy	Fitted distributions			*Normality Assumption*		
S Santa Fe	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	104,47	138,14	492,13	151,66	170,00	516,85
Stdev	154,00	127,10	392,87	147,46	151,76	342,98
LPM0= Prob(π<0)	0,22	0,12	0,02	0,13	0,10	0,04
LPM1=E(π / π<0)	-23,23	-10,36	-1,13	-11,51	-13,42	-7,75
LPM2= (Var(π / π<0))^0,5	63,19	38,83	11,90	41,38	55,70	48,74
UPM0= Prob(π>0)	0,78	0,88	0,99	0,87	0,90	0,96
UPM1=E(π / π>0)	127,71	148,50	493,26	163,17	183,42	524,59
UPM2= (Var(π / π>0))^0,5	175,04	183,65	629,60	207,45	220,97	618,37
CV = σ/μ	1,47	0,92	0,80	0,97	0,89	0,66
Ratio +E(π)/-E(π) = UPM1/LPM1	-5,50	-14,33	-435,64	-14,18	-13,67	-67,71
Ratio +V(π)/-V(π) = UPM2/LPM2	2,77	4,73	52,90	5,01	3,97	12,69
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,37	-0,27	-0,10	-0,28	-0,24	-0,16
Ratio -E(π)/-V(π) = UPM1/UPM2	0,73	0,81	0,78	0,79	0,83	0,85

Soy	Fitted distributions			*Normality Assumption*		
Salta	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-150,66	-120,84	130,97	-151,67	-133,29	107,85
Stdev	133,29	121,23	294,91	135,05	138,82	251,65
LPM0= Prob(π<0)	0,84	0,80	0,28	0,85	0,81	0,31
LPM1=E(π / π<0)	-160,40	-130,77	-32,23	-160,83	-143,47	-53,92
LPM2= (Var(π / π<0))^0,5	198,74	168,64	74,63	200,63	189,96	121,66
UPM0= Prob(π>0)	0,17	0,20	0,72	0,15	0,19	0,69
UPM1=E(π / π>0)	9,73	9,93	163,20	9,16	10,19	161,76
UPM2= (Var(π / π>0))^0,5	31,15	29,33	313,93	31,44	30,82	245,27
CV = σ/μ	-0,88	-1,00	2,25	-0,89	-1,04	2,33
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,06	-0,08	-5,06	-0,06	-0,07	-3,00
Ratio +V(π)/-V(π) = UPM2/LPM2	0,16	0,17	4,21	0,16	0,16	2,02
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,81	-0,78	-0,43	-0,80	-0,76	-0,44
Ratio -E(π)/-V(π) = UPM1/UPM2	0,31	0,34	0,52	0,29	0,33	0,66

Soy	Fitted distributions			*Normality Assumption*		
SE BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-84,12	-56,29	188,33	-68,22	-47,74	196,10
Stdev	150,71	135,46	269,96	152,60	149,39	276,05
LPM0= Prob(π<0)	0,68	0,62	0,19	0,00	0,00	0,00
LPM1=E(π / π<0)	-111,27	-85,89	-21,14	-1,66	-1,37	-0,58
LPM2= (Var(π / π<0))^0,5	160,32	132,71	62,28	19,58	18,26	12,46
UPM0= Prob(π>0)	0,32	0,38	0,81	1,00	1,00	1,00
UPM1=E(π / π>0)	27,15	29,61	209,47	0,53	0,57	3,84
UPM2= (Var(π / π>0))^0,5	63,93	62,48	323,21	8,98	8,66	41,81
CV = σ/μ	-1,79	-2,41	1,43	-2,24	-3,13	1,41
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,24	-0,34	-9,91	-0,32	-0,42	-6,59
Ratio +V(π)/-V(π) = UPM2/LPM2	0,40	0,47	5,19	0,46	0,47	3,36
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,69	-0,65	-0,34	-0,08	-0,07	-0,05
Ratio -E(π)/-V(π) = UPM1/UPM2	0,42	0,47	0,65	0,06	0,07	0,09

Soy	Fitted distributions			*Normality Assumption*		
W BS AS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-28,67	35,81	476,19	3,74	21,20	315,24
Stdev	165,48	157,39	479,23	173,34	177,91	328,26
LPM0= Prob(π<0)	0,53	0,36	0,06	0,45	0,38	0,14
LPM1=E(π / π<0)	-80,00	-47,25	-6,42	-66,69	-59,93	-24,46
LPM2= (Var(π / π<0))^0,5	137,34	99,68	33,72	124,48	124,80	85,50
UPM0= Prob(π>0)	0,47	0,64	0,94	0,55	0,62	0,86
UPM1=E(π / π>0)	51,33	83,06	482,61	70,44	81,13	339,69
UPM2= (Var(π / π>0))^0,5	96,65	126,95	674,74	120,69	128,55	447,01
CV = σ/μ	-5,77	4,40	1,01	46,31	8,39	1,04
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,64	-1,76	-75,15	-1,06	-1,35	-13,89
Ratio +V(π)/-V(π) = UPM2/LPM2	0,70	1,27	20,01	0,97	1,03	5,23
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,58	-0,47	-0,19	-0,54	-0,48	-0,29
Ratio -E(π)/-V(π) = UPM1/UPM2	0,53	0,65	0,72	0,58	0,63	0,76

Soy	Fitted distributions			*Normality Assumption*		
S Entre Rios	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-78,81	-44,37	240,94	-81,03	-63,35	219,45
Stdev	147,35	128,51	343,38	147,05	151,31	290,10
LPM0= Prob(π<0)	0,68	0,58	0,13	0,68	0,62	0,20
LPM1=E(π / π<0)	-106,77	-75,39	-15,43	-107,73	-94,58	-34,88
LPM2= (Var(π / π<0))^0,5	154,38	121,65	53,54	156,13	151,31	99,44
UPM0= Prob(π>0)	0,32	0,42	0,87	0,32	0,39	0,80
UPM1=E(π / π>0)	27,97	31,02	256,37	26,71	31,23	254,33
UPM2= (Var(π / π>0))^0,5	63,96	60,70	416,04	61,74	63,36	349,90
CV = σ/μ	-1,87	-2,90	1,43	-1,81	-2,39	1,32
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,26	-0,41	-16,62	-0,25	-0,33	-7,29
Ratio +V(π)/-V(π) = UPM2/LPM2	0,41	0,50	7,77	0,40	0,42	3,52
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,69	-0,62	-0,29	-0,69	-0,63	-0,35
Ratio -E(π)/-V(π) = UPM1/UPM2	0,44	0,51	0,62	0,43	0,49	0,73

Soy	Fitted distributions			*Normality Assumption*		
S SE Cordoba	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	160,59	184,48	540,27	-57,01	-39,21	249,11
Stdev	222,33	208,88	536,34	155,56	156,99	310,15
LPM0= Prob(π<0)	0,23	0,18	0,03	0,62	0,54	0,18
LPM1=E(π / π<0)	-20,03	-11,60	-1,21	-94,84	-82,42	-33,48
LPM2= (Var(π / π<0))^0,5	50,87	34,04	9,70	144,70	140,62	99,20
UPM0= Prob(π>0)	0,77	0,82	0,98	0,38	0,46	0,82
UPM1=E(π / π>0)	180,62	196,08	541,47	37,83	43,22	282,59
UPM2= (Var(π / π>0))^0,5	269,50	276,60	761,22	80,71	80,05	385,24
CV = σ/μ	1,38	1,13	0,99	-2,73	-4,00	1,25
Ratio +E(π)/-E(π) = UPM1/LPM1	-9,02	-16,91	-448,51	-0,40	-0,52	-8,44
Ratio +V(π)/-V(π) = UPM2/LPM2	5,30	8,12	78,51	0,56	0,57	3,88
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,39	-0,34	-0,12	-0,66	-0,59	-0,34
Ratio -E(π)/-V(π) = UPM1/UPM2	0,67	0,71	0,71	0,47	0,54	0,73

Soy	Fitted distributions			*Normality Assumption*		
Santiago del Estero	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-115,20	-86,10	176,26	-120,00	-103,53	153,45
Stdev	160,12	148,49	344,30	158,73	163,89	297,54
LPM0= Prob(π<0)	0,73	0,68	0,24	0,74	0,70	0,28
LPM1=E(π / π<0)	-137,58	-110,70	-33,97	-140,84	-128,12	-53,19
LPM2= (Var(π / π<0))^0,5	188,83	162,23	89,97	191,23	185,10	126,58
UPM0= Prob(π>0)	0,27	0,32	0,76	0,26	0,30	0,72
UPM1=E(π / π>0)	22,38	24,60	210,23	20,84	24,59	206,64
UPM2= (Var(π / π>0))^0,5	57,01	56,09	376,19	54,99	57,58	309,93
CV = σ/μ	-1,39	-1,72	1,95	-1,32	-1,58	1,94
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,16	-0,22	-6,19	-0,15	-0,19	-3,88
Ratio +V(π)/-V(π) = UPM2/LPM2	0,30	0,35	4,18	0,29	0,31	2,45
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,73	-0,68	-0,38	-0,74	-0,69	-0,42
Ratio -E(π)/-V(π) = UPM1/UPM2	0,39	0,44	0,56	0,38	0,43	0,67

Soy	Fitted distributions			*Normality Assumption*		
SW BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	102,06	126,34	409,39	-24,60	-8,19	276,82
Stdev	148,88	138,05	365,79	177,81	180,78	348,34
LPM0= Prob(π<0)	0,23	0,15	0,02	0,52	0,46	0,19
LPM1=E(π / π<0)	-17,06	-8,51	-1,04	-83,77	-76,17	-36,60
LPM2= (Var(π / π<0))^0,5	43,57	28,12	9,58	141,92	140,46	105,38
UPM0= Prob(π>0)	0,77	0,85	0,98	0,48	0,54	0,81
UPM1=E(π / π>0)	119,12	134,86	410,43	59,17	67,97	313,42
UPM2= (Var(π / π>0))^0,5	175,16	185,01	548,92	109,91	114,10	432,28
CV = σ/μ	1,46	1,09	0,89	-7,23	-22,07	1,26
Ratio +E(π)/-E(π) = UPM1/LPM1	-6,98	-15,84	-395,65	-0,71	-0,89	-8,56
Ratio +V(π)/-V(π) = UPM2/LPM2	4,02	6,58	57,30	0,77	0,81	4,10
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,39	-0,30	-0,11	-0,59	-0,54	-0,35
Ratio -E(π)/-V(π) = UPM1/UPM2	0,68	0,73	0,75	0,54	0,60	0,73

10.3.3. Sunflower Statistics

Sunflower	Fitted distributions			Normality Assumption		
E La Pampa	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-112,03	-76,30	121,93	-108,75	-85,20	115,38
Stdev	139,69	135,46	258,78	142,47	154,17	253,44
LPM0= Prob(π<0)	0,76	0,67	0,28	0,75	0,66	0,30
LPM1=E(π / π<0)	-128,83	-99,24	-34,85	-126,46	-110,73	-51,43
LPM2= (Var(π / π<0))^0,5	172,99	146,69	82,51	172,85	166,87	117,84
UPM0= Prob(π>0)	0,24	0,33	0,72	0,25	0,34	0,70
UPM1=E(π / π>0)	16,80	22,93	156,79	17,71	25,53	166,82
UPM2= (Var(π / π>0))^0,5	46,22	51,50	273,91	47,43	56,41	252,30
CV = σ/μ	-1,25	-1,78	2,12	-1,31	-1,81	2,20
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,13	-0,23	-4,50	-0,14	-0,23	-3,24
Ratio +V(π)/-V(π) = UPM2/LPM2	0,27	0,35	3,32	0,27	0,34	2,14
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,74	-0,68	-0,42	-0,73	-0,66	-0,44
Ratio -E(π)/-V(π) = UPM1/UPM2	0,36	0,45	0,57	0,37	0,45	0,66
Sunflower	**Fitted distributions**			***Normality Assumption***		
SW BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	12,71	54,72	302,16	-44,24	-14,62	217,89
Stdev	135,86	119,51	291,01	147,48	162,16	289,49
LPM0= Prob(π<0)	0,41	0,28	0,07	0,58	0,47	0,20
LPM1=E(π / π<0)	-47,03	-26,76	-5,59	-83,44	-71,30	-33,58
LPM2= (Var(π / π<0))^0,5	90,36	63,87	27,64	132,42	131,18	97,56
UPM0= Prob(π>0)	0,59	0,72	0,93	0,42	0,53	0,80
UPM1=E(π / π>0)	59,74	81,48	307,75	39,19	56,68	251,46
UPM2= (Var(π / π>0))^0,5	102,25	114,88	418,59	78,56	96,44	348,94
CV = σ/μ	10,69	2,18	0,96	-3,33	-11,09	1,33
Ratio +E(π)/-E(π) = UPM1/LPM1	-1,27	-3,05	-55,07	-0,47	-0,79	-7,49
Ratio +V(π)/-V(π) = UPM2/LPM2	1,13	1,80	15,14	0,59	0,74	3,58
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,52	-0,42	-0,20	-0,63	-0,54	-0,34
Ratio -E(π)/-V(π) = UPM1/UPM2	0,58	0,71	0,74	0,50	0,59	0,72
Sunflower	**Fitted distributions**			***Normality Assumption***		
S SE Cordoba	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-83,64	-45,84	184,59	-82,90	-52,29	164,84
Stdev	143,33	131,38	281,71	141,06	153,53	262,30
LPM0= Prob(π<0)	0,69	0,59	0,20	0,69	0,56	0,23
LPM1=E(π / π<0)	-108,22	-77,92	-22,35	-106,51	-87,67	-40,61
LPM2= (Var(π / π<0))^0,5	155,14	123,85	64,20	154,14	147,45	109,37
UPM0= Prob(π>0)	0,31	0,41	0,80	0,31	0,44	0,77
UPM1=E(π / π>0)	24,57	32,09	206,93	23,61	35,38	205,45
UPM2= (Var(π / π>0))^0,5	58,91	63,43	330,62	54,89	67,58	289,85
CV = σ/μ	-1,71	-2,87	1,53	-1,70	-2,94	1,59
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,23	-0,41	-9,26	-0,22	-0,40	-5,06
Ratio +V(π)/-V(π) = UPM2/LPM2	0,38	0,51	5,15	0,36	0,46	2,65
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,70	-0,63	-0,35	-0,69	-0,59	-0,37
Ratio -E(π)/-V(π) = UPM1/UPM2	0,42	0,51	0,63	0,43	0,52	0,71

Sunflower *SE BS AS*	Fitted distributions Profits	 Profits mobile	 Profits w/o	*Normality Assumption* Profits	 Profits mobile	 Profits w/o
E(x)	-51,60	-15,65	187,04	-60,14	-34,44	164,14
Stdev	138,68	131,64	268,29	138,88	150,35	264,59
LPM0= Prob(π<0)	0,62	0,49	0,18	0,63	0,53	0,23
LPM1=E(π / π<0)	-84,46	-60,38	-18,62	-90,30	-77,22	-40,03
LPM2= (Var(π / π<0))^0,5	129,56	106,07	55,43	137,00	133,05	105,45
UPM0= Prob(π>0)	0,38	0,51	0,82	0,37	0,47	0,77
UPM1=E(π / π>0)	32,87	44,73	205,66	30,16	42,78	204,17
UPM2= (Var(π / π>0))^0,5	71,47	79,52	322,32	64,31	78,02	292,97
CV = σ/μ	-2,69	-8,41	1,43	-2,31	-4,37	1,61
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,39	-0,74	-11,04	-0,33	-0,55	-5,10
Ratio +V(π)/-V(π) = UPM2/LPM2	0,55	0,75	5,81	0,47	0,59	2,78
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,65	-0,57	-0,34	-0,66	-0,58	-0,38
Ratio -E(π)/-V(π) = UPM1/UPM2	0,46	0,56	0,64	0,47	0,55	0,70

Sunflower *W BSAS*	Fitted distributions Profits	 Profits mobile	 Profits w/o	*Normality Assumption* Profits	 Profits mobile	 Profits w/o
E(x)	57,27	97,49	358,78	18,10	43,92	279,45
Stdev	152,73	145,56	345,08	129,72	146,09	274,62
LPM0= Prob(π<0)	0,32	0,22	0,06	0,39	0,30	0,13
LPM1=E(π / π<0)	-35,13	-22,02	-5,28	-42,96	-39,27	-21,08
LPM2= (Var(π / π<0))^0,5	77,67	60,11	28,69	85,24	94,76	76,29
UPM0= Prob(π>0)	0,68	0,78	0,94	0,61	0,70	0,87
UPM1=E(π / π>0)	92,40	119,51	364,06	61,06	83,19	300,53
UPM2= (Var(π / π>0))^0,5	143,44	164,56	496,97	99,45	119,55	384,31
CV = σ/μ	2,67	1,49	0,96	7,17	3,33	0,98
Ratio +E(π)/-E(π) = UPM1/LPM1	-2,63	-5,43	-68,99	-1,42	-2,12	-14,26
Ratio +V(π)/-V(π) = UPM2/LPM2	1,85	2,74	17,32	1,17	1,26	5,04
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,45	-0,37	-0,18	-0,50	-0,41	-0,28
Ratio -E(π)/-V(π) = UPM1/UPM2	0,64	0,73	0,73	0,61	0,70	0,78

10.3.4. Wheat Statistics

Wheat	Fitted distributions			Normality Assumption		
E La Pampa	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-227,40	-157,23	-48,87	-269,45	-202,63	-106,37
Stdev	118,17	141,33	213,92	91,03	135,53	189,79
LPM0= Prob(π<0)	0,96	0,85	0,62	0,99	0,91	0,69
LPM1=E(π / π<0)	-228,64	-166,36	-105,73	-269,62	-206,63	-142,15
LPM2= (Var(π / π<0))^0,5	256,10	209,12	159,54	284,40	243,11	199,99
UPM0= Prob(π>0)	0,04	0,15	0,38	0,01	0,09	0,31
UPM1=E(π / π>0)	1,25	9,12	56,86	0,16	4,00	35,79
UPM2= (Var(π / π>0))^0,5	9,32	31,06	150,65	2,73	18,11	85,65
CV = σ/μ	-0,52	-0,90	-4,38	-0,34	-0,67	-1,78
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,01	-0,05	-0,54	-0,00	-0,02	-0,25
Ratio +V(π)/-V(π) = UPM2/LPM2	0,04	0,15	0,94	0,01	0,07	0,43
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,89	-0,80	-0,66	-0,95	-0,85	-0,71
Ratio -E(π)/-V(π) = UPM1/UPM2	0,13	0,29	0,38	0,06	0,22	0,42

Wheat	Fitted distributions			Normality Assumption		
S Santa Fe	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-66,32	24,51	173,74	-70,66	21,10	155,29
Stdev	161,07	198,24	341,44	148,13	197,28	279,00
LPM0= Prob(π<0)	0,68	0,43	0,24	0,65	0,41	0,27
LPM1=E(π / π<0)	-100,27	-60,40	-31,25	-100,18	-69,20	-47,24
LPM2= (Var(π / π<0))^0,5	146,34	113,09	79,30	150,19	135,24	114,44
UPM0= Prob(π>0)	0,32	0,57	0,76	0,35	0,59	0,73
UPM1=E(π / π>0)	33,94	84,91	204,99	29,52	90,30	202,53
UPM2= (Var(π / π>0))^0,5	94,48	164,65	374,81	66,15	145,17	298,09
CV = σ/μ	-2,43	8,09	1,97	-2,10	9,35	1,80
Ratio +E(π)/-E(π) = UPM1/LPM1	0,34	1,41	6,56	-0,29	-1,30	-4,29
Ratio +V(π)/-V(π) = UPM2/LPM2	0,65	1,46	4,73	0,44	1,07	2,60
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,69	-0,53	-0,39	-0,67	-0,51	-0,41
Ratio -E(π)/-V(π) = UPM1/UPM2	0,36	0,52	0,55	0,45	0,62	0,68

Wheat	Fitted distributions			Normality Assumption		
SE BSAS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-336,69	-215,53	-40,22	-13,52	83,07	233,35
Stdev	221,70	264,29	397,87	164,01	216,63	311,13
LPM0= Prob(π<0)	0,93	0,78	0,57	0,49	0,31	0,20
LPM1=E(π / π<0)	-343,80	-246,36	-165,70	-71,64	-51,92	-35,48
LPM2= (Var(π / π<0))^0,5	401,27	328,59	263,35	126,79	118,79	100,86
UPM0= Prob(π>0)	0,07	0,22	0,43	0,51	0,69	0,80
UPM1=E(π / π>0)	7,10	30,83	125,47	58,12	134,99	268,82
UPM2= (Var(π / π>0))^0,5	38,66	91,26	300,94	104,90	199,29	375,60
CV = σ/μ	-0,66	-1,23	-9,89	-12,13	2,61	1,33
Ratio +E(π)/-E(π) = UPM1/LPM1	0,02	0,13	0,76	-0,81	-2,60	-7,58
Ratio +V(π)/-V(π) = UPM2/LPM2	0,10	0,28	1,14	0,83	1,68	3,72
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,86	-0,75	-0,63	-0,57	-0,44	-0,35
Ratio -E(π)/-V(π) = UPM1/UPM2	0,18	0,34	0,42	0,55	0,68	0,72

Wheat	Fitted distributions			Normality Assumption		
W BS AS	Profits	Profits mobile	Profits w/o	Profits	Profits mobile	Profits w/o
E(x)	-32,13	50,73	186,73	-30,39	48,13	177,19
Stdev	135,43	160,70	280,99	132,13	177,52	255,71
LPM0= Prob(π<0)	0,57	0,35	0,20	0,55	0,35	0,22
LPM1=E(π / π<0)	-70,43	-40,19	-22,09	-68,72	-49,65	-32,98
LPM2= (Var(π / π<0))^0,5	115,13	85,36	62,76	113,13	106,60	91,23
UPM0= Prob(π>0)	0,43	0,65	0,80	0,45	0,65	0,78
UPM1=E(π / π>0)	38,30	90,93	208,82	38,32	97,78	210,17
UPM2= (Var(π / π>0))^0,5	78,22	145,30	331,49	74,72	149,90	297,42
CV = σ/μ	-4,22	3,17	1,50	-4,35	3,69	1,44
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,54	-2,26	-9,45	-0,56	-1,97	-6,37
Ratio +V(π)/-V(π) = UPM2/LPM2	0,68	1,70	5,28	0,66	1,41	3,26
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,61	-0,47	-0,35	-0,61	-0,47	-0,36
Ratio -E(π)/-V(π) = UPM1/UPM2	0,49	0,63	0,63	0,51	0,65	0,71

Wheat *N BSAS*	Fitted distributions Profits	Profits mobile	Profits w/o	*Normality Assumption* Profits	Profits mobile	Profits w/o
E(x)	-35,63	65,01	224,38	17,11	105,47	262,71
Stdev	155,47	187,28	325,86	163,15	217,71	306,79
LPM0= Prob(π<0)	0,57	0,34	0,20	0,41	0,27	0,17
LPM1=E(π / π<0)	-80,48	-44,41	-24,62	-56,91	-45,16	-28,26
LPM2= (Var(π / π<0))^0,5	130,96	96,26	69,40	111,02	111,32	89,23
UPM0= Prob(π>0)	0,43	0,66	0,80	0,59	0,73	0,83
UPM1=E(π / π>0)	44,86	109,42	249,00	74,02	150,63	290,97
UPM2= (Var(π / π>0))^0,5	91,04	173,31	389,50	120,77	214,78	393,92
CV = σ/μ	-4,36	2,88	1,45	9,53	2,06	1,17
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,56	-2,46	-10,11	-1,30	-3,34	-10,30
Ratio +V(π)/-V(π) = UPM2/LPM2	0,70	1,80	5,61	1,09	1,93	4,41
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,61	-0,46	-0,35	-0,51	-0,41	-0,32
Ratio -E(π)/-V(π) = UPM1/UPM2	0,49	0,63	0,64	0,61	0,70	0,74

Wheat *S SE Cordoba*	Fitted distributions Profits	Profits mobile	Profits w/o	*Normality Assumption* Profits	Profits mobile	Profits w/o
E(x)	-102,37	-26,46	97,36	-85,31	-12,00	105,89
Stdev	244,55	257,72	335,11	142,13	179,14	246,06
LPM0= Prob(π<0)	0,70	0,49	0,32	0,69	0,48	0,31
LPM1=E(π / π<0)	-126,22	-88,40	-59,71	-108,61	-77,77	-51,79
LPM2= (Var(π / π<0))^0,5	258,34	232,64	205,71	156,33	137,36	115,79
UPM0= Prob(π>0)	0,30	0,51	0,68	0,31	0,52	0,69
UPM1=E(π / π>0)	23,84	61,94	157,07	23,30	65,78	157,68
UPM2= (Var(π / π>0))^0,5	59,55	114,02	281,88	55,13	115,61	241,56
CV = σ/μ	-2,39	-9,74	3,44	-1,67	-14,93	2,32
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,19	-0,70	-2,63	-0,21	-0,85	-3,04
Ratio +V(π)/-V(π) = UPM2/LPM2	0,23	0,49	1,37	0,35	0,84	2,09
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,49	-0,38	-0,29	-0,69	-0,57	-0,45
Ratio -E(π)/-V(π) = UPM1/UPM2	0,40	0,54	0,56	0,42	0,57	0,65

Wheat *SW BS AS*	Fitted distributions Profits	Profits mobile	Profits w/o	*Normality Assumption* Profits	Profits mobile	Profits w/o
E(x)	-5,14	81,28	227,06	-13,56	69,80	207,91
Stdev	140,92	177,75	313,94	143,35	199,00	291,13
LPM0= Prob(π<0)	0,50	0,31	0,18	0,51	0,33	0,22
LPM1=E(π / π<0)	-57,43	-33,93	-18,06	-64,02	-49,61	-34,51
LPM2= (Var(π / π<0))^0,5	98,49	75,10	53,89	110,77	107,82	92,67
UPM0= Prob(π>0)	0,50	0,69	0,82	0,49	0,67	0,78
UPM1=E(π / π>0)	52,30	115,21	245,12	50,46	119,41	242,42
UPM2= (Var(π / π>0))^0,5	100,91	180,44	383,68	92,00	181,25	345,54
CV = σ/μ	-27,43	2,19	1,38	-10,57	2,85	1,40
Ratio +E(π)/-E(π) = UPM1/LPM1	-0,91	-3,40	-13,57	-0,79	-2,41	-7,02
Ratio +V(π)/-V(π) = UPM2/LPM2	1,02	2,40	7,12	0,83	1,68	3,73
Ratio -E(π)/-V(π) = LPM1/LPM2	-0,58	-0,45	-0,34	-0,58	-0,46	-0,37
Ratio -E(π)/-V(π) = UPM1/UPM2	0,52	0,64	0,64	0,55	0,66	0,70

10.4. Extended discussion

10.4.1. Production, acreage and average yield in argentine agriculture

Growth in soybean production during the 1990s was very rapid until 2006 when it seemed to stabilize around 45 million tons, arguably due to lack of more available and unexploited areas and the increased cost of production, especially land rent, transportation, and the continuous increment in export taxes applied on FOB prices.

Wheat production also increased during the analyzed period reaching 16 million tons

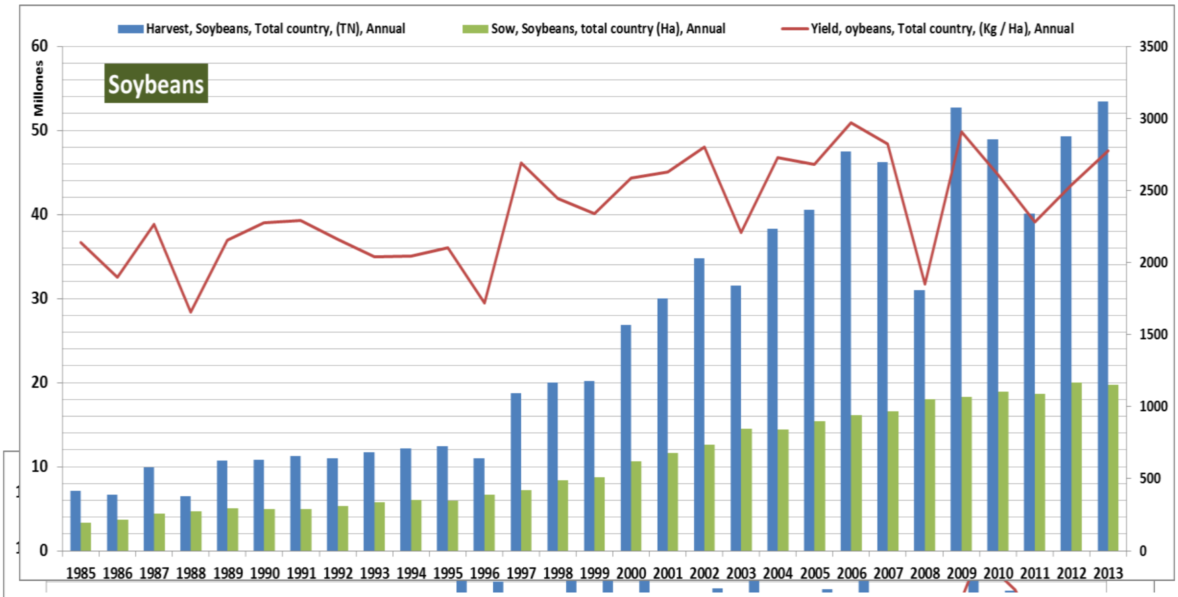


Figure 10-1. Soybeans production (million TN/Ha), yields (Kg/Ha) and acreage (Ha) during 1985 to 2013 period. Source: own elaboration based on data from "Integrated Agricultural Information System", Ministry of Agriculture, Cattle, and Fisheries" , SIIA-MAGYP

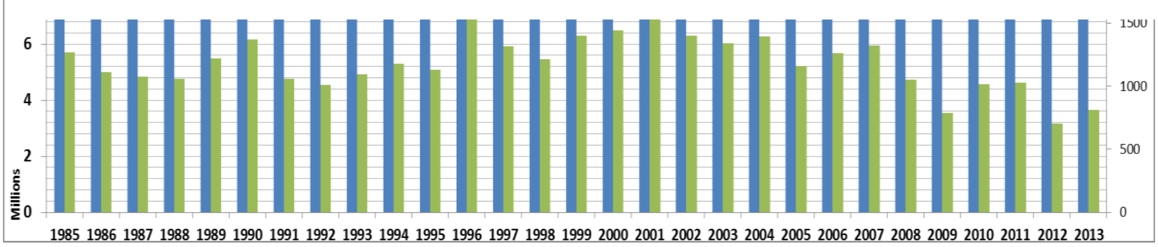


Figure 10-2. Wheat production (million TN/Ha), yields (Kg/Ha) and acreage (Ha) during 1985 to 2013 period. Source: own elaboration based on data from "Integrated Agricultural Information System", Ministry of Agriculture, Cattle, and Fisheries", SIIA- MAGYP.

in the year 2000 from 6 million hectares. The following years the total production fluctuated due to different factors, like weather conditions, droughts, volatile prices and since the year 2002 the intervention of the government through export taxes. It is clearly shown in the (Figure 10-2) that the acreage declined after 2007 apparently due to the lack of profitability in some areas, and the consequent change in the farmers' choice of crop rotation system, leaving more hectares to the soybeans production

More emblematic of the consequence of implementing export taxes is the unprecedented decline in sunflower production (Figure 10-3). However this crop also faced the same conditions leading to increased planted acreage, yields and production as the other crops during the 1990s. After the economic crisis in 2001/02 and the implementation of export taxes in 2002, the decline was fast despite the higher world prices. In 2013 only 1.3 million hectares were sowed. Again the farmer's crop choice shifted to soybeans in most cases.

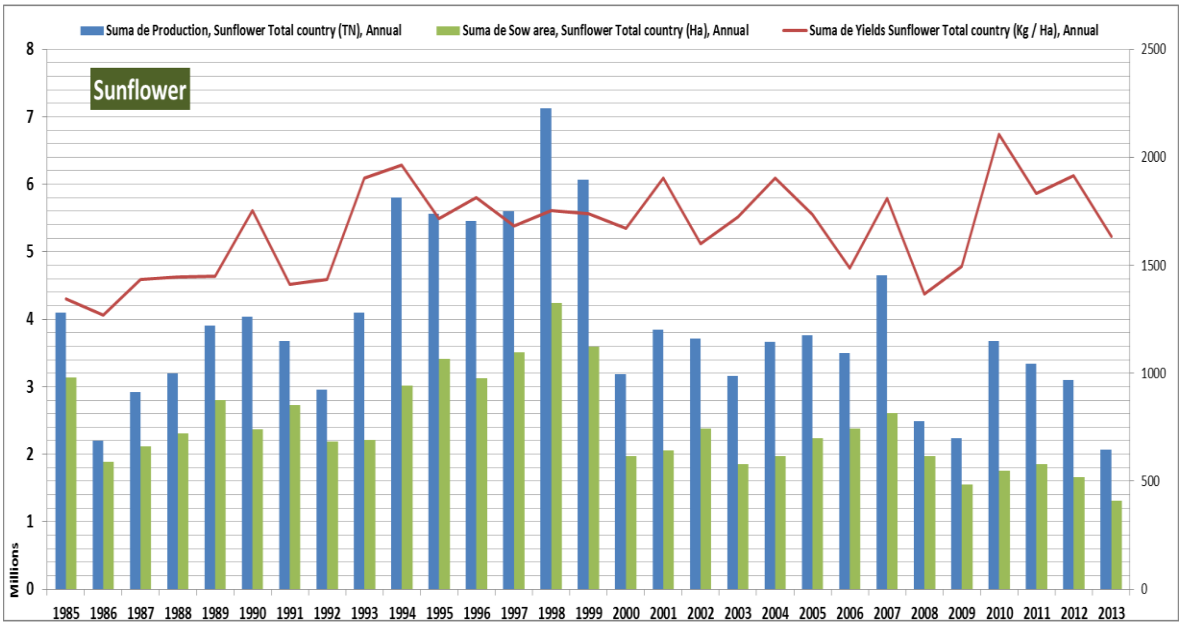


Figure 10-3. Sunflower production (million TN/Ha), yields (Kg/Ha) and acreage (Ha) during 1985 to 2013 period. Source: own elaboration based on data from "Integrated Agricultural Information System", Ministry of Agriculture, Cattle, and Fisheries, SIIA-MAGYP.

Finally, the case of Corn, our fourth crop in analysis, showed also a continuous increase in production and yields thanks to technology, but fluctuating acreage (Figure 10-4). Only in the last years of this series has acreage expanded reaching 6 million hectares. Corn yield is very dependent on the level of fertilizer applied and the natural quality of the soil, so

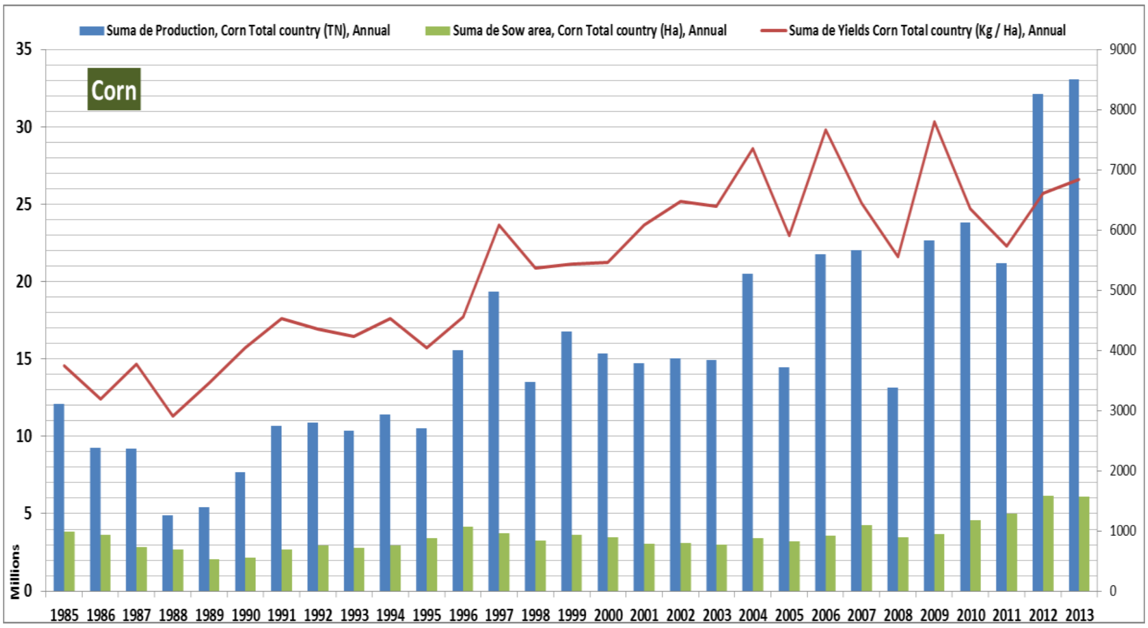


Figure 10-4. Corn production (million TN/Ha), yields (Kg/Ha) and acreage (Ha) during 1985 to 2013 period. Source: own elaboration based on data from "Integrated Agricultural Information System", Ministry of Agriculture, Cattle, and Fisheries", SIIA-MAGYP.

the direct cost of production could be double the cost in soybeans production, making corn production more sensitive to price and yields and therefore gross margins. However, given that the farmers who follow crop rotations need this crop in order to restore the natural fertility of the soil thanks to the higher amount of residues left after harvest that are incorporated during winter into the first layers of the soil, acreage has remained stable .

10.4.2. Tax Burden and transfer to Government

Total Transfers to Government (TTG) is the amount that the government receives from the production activities by the following TTG = Export tax + IT

[10-1:

$$TTG = \text{Export tax} + IT \qquad [10\text{-}1]$$

Tax burden % (TB %) is the total taxation in percentage withheld from the firm´s Gross Revenues (GR). The TB% TB % = TTG / GR

[10-2] is as follow:

$$TB\ \% = TTG / GR \qquad [10\text{-}2]$$

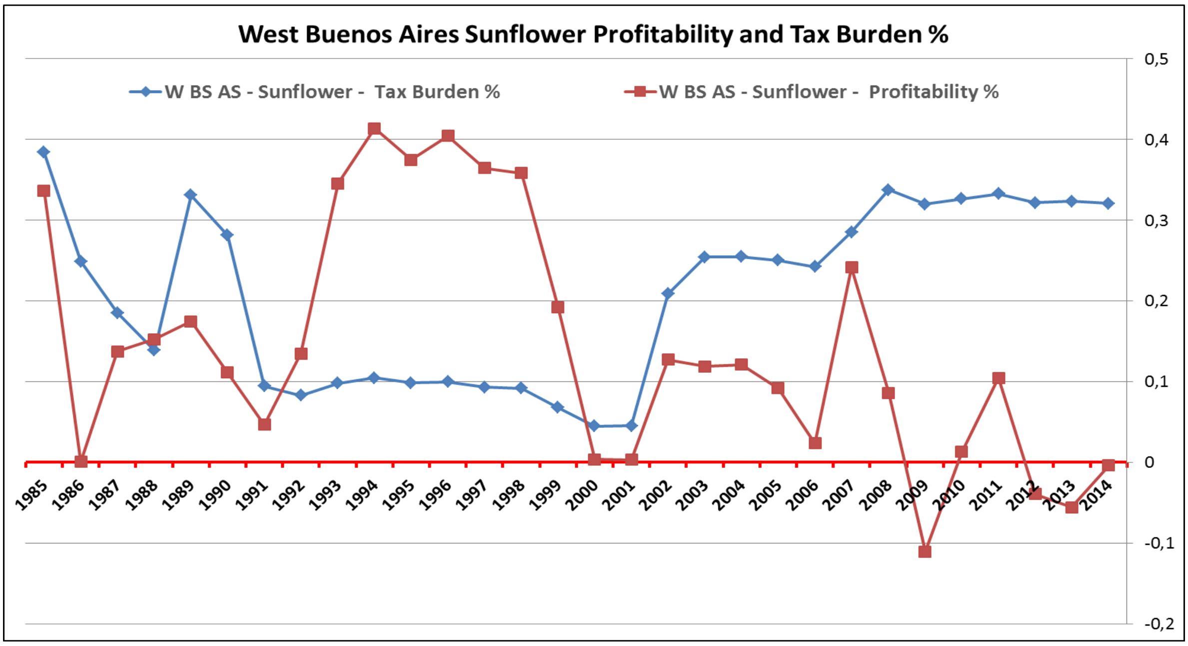


Figure 10-5. West Buenos Aires Sunflower Profitability and Tax Burden in percentage.

The resulting amount is the Profit (π) generated by the production process of the firm. At the same time we can calculate the total amount paid by farmers to the Government. Total Government Revenues are the sum of the export tax amount, the debit and credit tax and

Income return tax. This can be represented in percentage as a Tax Burden for the farmers in dollars per hectare (Figure 10-5).

We previously did not consider the Land Rent cost. The above Profits represent a farmer producing on their own land. An accurate measure of the cost of production should include a return to owned land. That is what the profits you are measuring are used for: they cover payment to family labor and the opportunity cost of the land. The returns (profits) need to be high enough to keep the family and the land in their current occupations. Given that a large proportion of land in Argentina is under one of many different land-rent systems, it is interesting to analyze Profits after paying the land rent. A profit over capital is a measure of the percentage return for capital investment (Profit over the sum of direct and overhead costs). Net returns after land rent would be the final result for the firm.

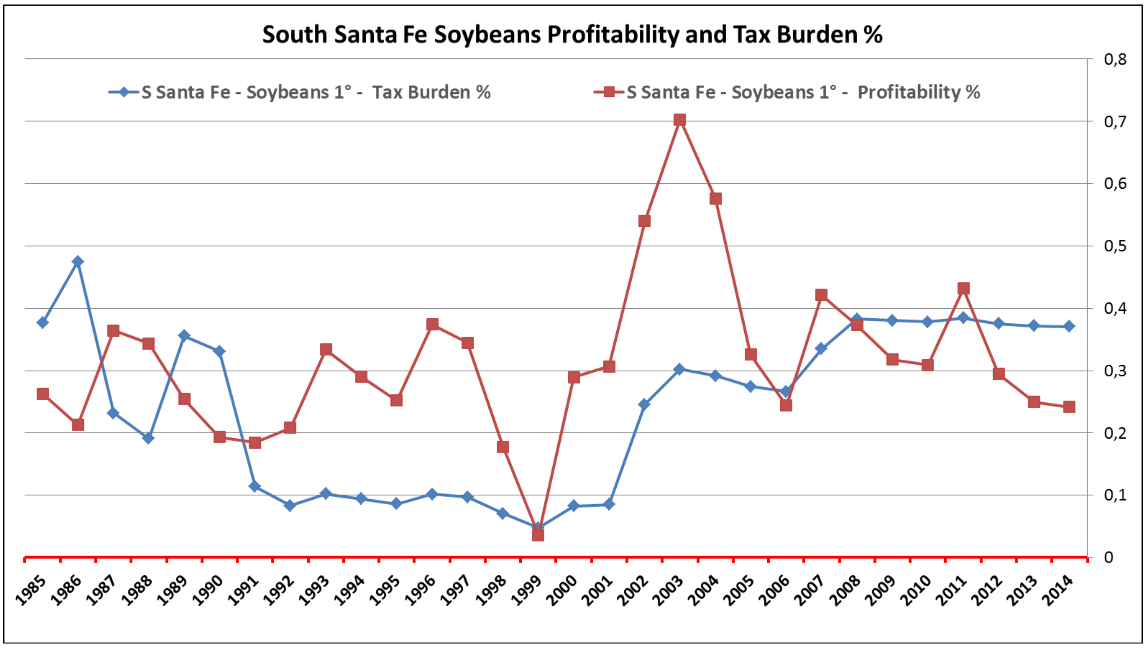


Figure 10-6. South Santa Fe Soybeans Profitability and Tax Burden in percentage.

As in can be seen in Figure 10-8 the Tax Burden has become larger than the profitability of wheat firms in the area of Southeast Buenos Aires. This region is the principal wheat productive area. During the year 2012 the firms experienced losses.

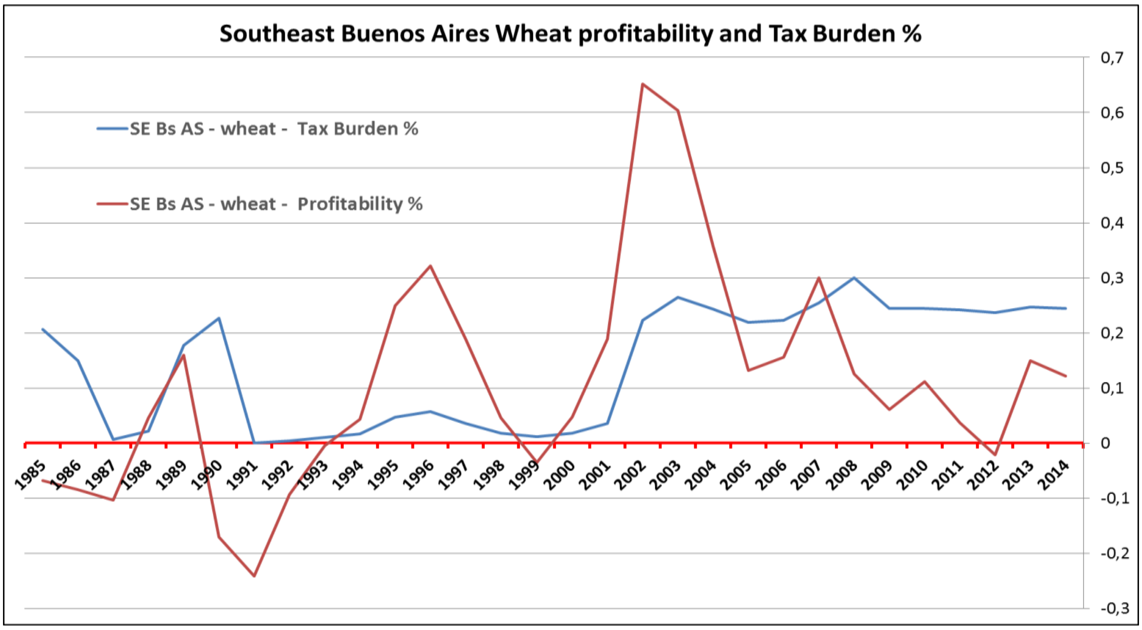


Figure 10-8. Southeast Buenos Aires Wheat Profitability and Tax Burden in percentage.

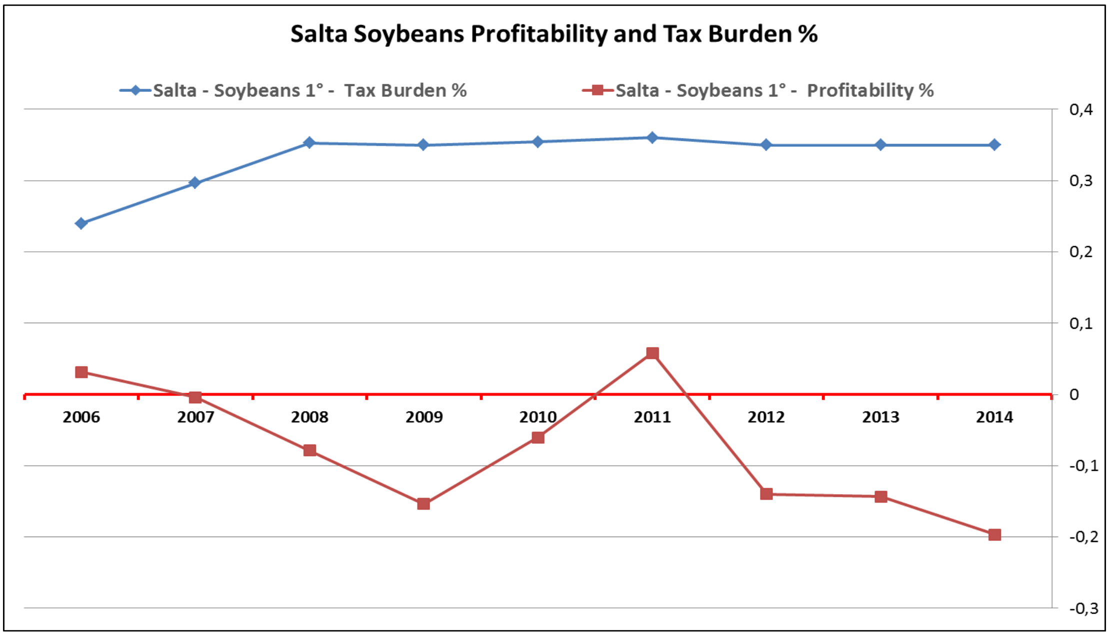


Figure 10-7. Salta Soybeans Profitability and Tax Burden in percentage.

The loss in profitability in wheat and sunflower entreprizes leads the farmers to adjust or change their crop selection decisions. In general, the farmers' strategy is to desing a crop rotation in order to maintane an agronomic equilibrium in the productive plots, however the tendency is to increase the acreage of soybeans given the fact that is the most profitable crop in Argentina. An example of profits is shown in Figure 10-6 for the region South Santa Fe, one of the main productive areas.

The core soybean areas exhibit positive profits in contrast with the marginal areas which during the last years had become non profitable. These marginal areas like Salta and Santiago del Estero where develop at the end of the 90'and during the 2000's. The forest in those areas was cut down and replaced by a non-rotation cropping system of only soybeans which leads to a depletion of soil fertility and therefore the potential yields decreases over the years and so the profitability. Furthermore the distance to the ports increases the costs. The last years as it can be seen in the Figure 10-7 were non-profitable.

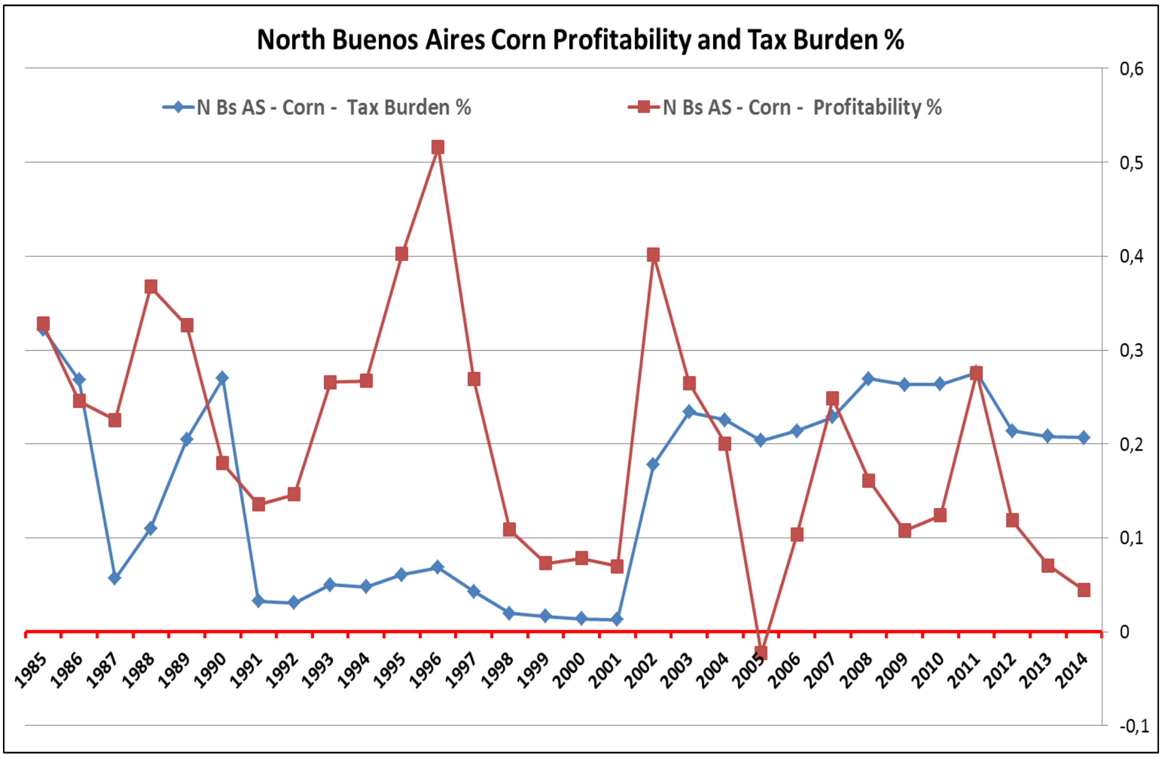


Figure 10-9. North Buenos Aires Corn Profitability and Tax Burden in percentage.

The corn production follows the soybeans profits but the last years its profitability has being decreasing (Figure 10-9). This crop is important in crop rotation for its residues that increase soil organic matter and physical quality. The larger investment amounts needed for the corn production along with the increases in the export tax on this crop had led the farmers to change to soybeans in many cases.

10.5. Test for significant differences between means and F-Test for variances

Test Corn N BSAS overall means comparison between fixed-rate export tax model and without export tax model.

	Profit fixed-rate export tax	*Profits without export tax*
Mean	32,92352081	512,9154993
Variance	50841,02062	415666,2208
observations	5000	5000
Pearson correlation Coefficient	0,863432025	
H0	0	E(π FIX) = E(π without)
DF	4999	
T statistic	-73,11816429	
P(T<=t) one tail	0	
T critic value (one tail)	1,645158499	
P(T<=t) two tails	0	significantly different
T critic value (two tails)	1,960438647	

T Test for pairwise sample means

	Profit variable-rate export tax	*Profits without export tax*
Mean	149,950167	512,9154993
Variance	52992,62946	415666,2208
observations	5000	5000
Pearson correlation Coefficient	0,829605372	
H0	0	E(π mobile) = E(π without)
DF	4999	
T statistic	-54,42232768	
P(T<=t) one tail	0	
T critic value (one tail)	1,645158499	
P(T<=t) two tails	0	significantly different
T critic value (two tails)	1,960438647	

F test for two sample variances

H0 = equal variances	*Profit fixed-rate export tax*	*Profit variable-rate export tax*
Mean	32,92352081	149,950167
Variance	50841,02062	52992,62946
observations	5000	5000
DF	4999	4999
F = S22/S21	0,959397961	Fail to reject H0
P(F<=f) one tail	0,071435588	
F critic value (one tail)	0,954533476	

Reject H_0 if $F_c < F_{a/2}$ or if $F_c > F_{1-a/2}$

F test for two sample variances

H0 = equal variances	*Profit fixed-rate export tax*	*Profits without export tax*
Mean	32,92352081	512,9154993
Variance	50841,02062	415666,2208
Observations	5000	5000
DF	4999	4999
F = S22/S21	0,122312129	
P(F<=f) one tail	0	
F critic value (one tail)	0,954533476	

Reject H_0 if $F_c < F_{a/2}$ or if $F_c > F_{1-a/2}$

F test for two sample variances

H0 = equal variances	*Profit variable-rate export tax*	*Profits without export tax*
Mean	149,950167	512,9154993
Variance	52992,62946	415666,2208
Observations	5000	5000
DF	4999	4999
F = S22/S21	0,127488419	
P(F<=f) one tail	0	
F critic value (one tail)	0,954533476	

Reject H_0 if $F_c < F_{a/2}$ or if $F_c > F_{1-a/2}$

Test Soy South Southeast Cordoba overall mean versus South Santa Fe overall means, for the three models

T Test for pairwise sample means

Models	*SSECCF**	*SSFCF***
Mean	160,5869834	-133,7973285
Variance	49440,72558	121614,9424
observations	5000	5000
H0	0	
DF	8487	
T statistic	50,33046348	
P(T<=t) one tail	0	
T critic value (one tail)	1,645033188	
P(T<=t) two tails	0	significantly different
T critic value (two tails)	1,960243542	

**South Southeast Cordoba with Fixed export tax model*
*** South Santa Fe with Fixed export tax model*

T Test for pairwise sample means

Models	*SSECVR*	*SSFVR*
Mean	184,4833645	-21,98379697
Variance	43639,71369	160358,6936
observations	5000	5000
H0	0	
DF	7532	
T statistic	32,32381413	
P(T<=t) one tail	4,5171E-215	
T critic value (one tail)	1,645055958	
P(T<=t) two tails	9,0342E-215	significantly different
T critic value (two tails)	1,960278993	

**South Southeast Cordoba with variable-rate export tax model*
*** South Santa Fe with variable-rate export tax model*

T Test for pairwise sample means

Models	*SSECNT*	*SSFNT*
Mean	540,2665424	182,5329356
Variance	287722,1672	504307,0595
observations	5000	5000
H0	0	
DF	9302	
T statistic	28,42327648	
P(T<=t) one tail	8,6922E-171	
T critic value (one tail)	1,645017454	
P(T<=t) two tails	1,7384E-170	significantly different
T critic value (two tails)	1,960219045	

**South Southeast Cordoba with variable-rate export tax model*
*** South Santa Fe with variable-rate export tax model*

Test Corn North Buenos Aires overall mean of model with normally distributed variables versus overall mean of model with fitted distributions.

T Test for two sample with unequal variances

Model	*Normality Model fixed-rate*	*Fitted Model fixed-rate*
Mean	37,67053372	32,92352081
Variance	50132,99436	50841,02062
observations	5000	5000
H0	0	
DF	9998	
T statistic	1,056332403	
P(T<=t) one tail	0,14542095	
T critic value (one tail)	1,645006049	
P(T<=t) two tails	0,2908419	Not significantly different
T critic value (two tails)	1,960201287	

T Test for two sample with unequal variances

Model	*Normality Model Variable-rate*	*Fitted Model Variable-rate*
Mean	137,1893792	149,950167
Variance	70484,19036	52992,62946
observations	5000	5000
H0	0	
DF	9801	
T statistic	-2,567850718	
P(T<=t) one tail	0,005123904	
T critic value (one tail)	1,645009113	
P(T<=t) two tails	0,010247808	significantly different
T critic value (two tails)	1,960206058	

T Test for pairwise sample means

	Normality without export tax	*Profits without export tax*
Mean	487,2719892	512,9154993
Variance	242460,2059	415666,2208
observations	5000	5000
Pearson correlation Coefficient	-0,005757804	
H0	0	
DF	4999	
T statistic	-2,228973635	
P(T<=t) one tail	0,012929969	
T critic value (one tail)	1,645158499	
P(T<=t) two tails	0,025859938	significantly different
T critic value (two tails)	1,960438647	

10.6. Profit function input variable's PDFs and CDFs

Lognormal distribution: is a continuous probability distribution of a random variable whose logarithm is normally distributed, and it was used for the variables FAS and DC. The CDF equation [10-3 is as follow:

$$F_X(x;\mu,\sigma) = \int_0^x f_X(\xi;\mu,\sigma)d\xi = \frac{1}{2}\left[1+\operatorname{erf}\left(\frac{\ln x-\mu}{\sigma\sqrt{2}}\right)\right] = \frac{1}{2}\operatorname{erfc}\left(-\frac{\ln x-\mu}{\sigma\sqrt{2}}\right) = \Phi\left(\frac{\ln x-\mu}{\sigma}\right)$$

[10-3]

Where erfc is the complementary error function, and Φ is the cumulative distribution function of the Standard normal distribution.

Weibull distribution: is a continuous probability distribution. Where k > 0 is the shape parameter and λ > 0 is the scale parameter of the distribution, and it was used for the variable IC. The CDF

$$F(x;k,\lambda) = 1 - e^{-(x/\lambda)^k}$$

for $x \geq 0$, and $F(x; k; \lambda) = 0$ for $x < 0$. [10-4 is a stretched exponential function and is shown as follow:

$$F(x;k,\lambda) = 1 - e^{-(x/\lambda)^k}$$

for $x \geq 0$, and $F(x; k; \lambda) = 0$ for $x < 0$. [10-4]

Gamma distribution: is a two-parameter family of continuous probability distributions. In our case we used for the variables MKT and Q the special distribution with a shape parameter α (equal to k) and an inverse scale parameter β = 1/θ, (rate parameter), expressed in

$$F(x;\alpha,\beta) = \int_0^x f(u;\alpha,\beta)\,du = \frac{\gamma(\alpha,\beta x)}{\Gamma(\alpha)}$$

[10-5as follow:

$$F(x;\alpha,\beta) = \int_0^x f(u;\alpha,\beta)\,du = \frac{\gamma(\alpha,\beta x)}{\Gamma(\alpha)}$$ [10-5]

Burr 3 Parameter distribution: is a continuous distribution for a non-negative random variable, with common use in econometrics. It was used for FAS, FAS w/o, FOB, IC, DC, MKT and Q. The CDF $F(x) = \left(1 + \left(\frac{\beta}{x-\gamma}\right)^{\alpha}\right)^{-1}$

[10-6is as follow:

$$F(x) = \left(1 + \left(\frac{\beta}{x-\gamma}\right)^{\alpha}\right)^{-1}$$ [10-6]

Where k is a continuous shape parameter (k>0), α is a continuous shape parameter (α>0), β is a continuous scale parameter (β>0) and γ is a continuous location parameter.

Beta distribution: is a continuous probability distribution defined on the interval [0,1], where α1 is a continuous shape parameter (α1>0), α2 is a continuous shape parameter (α2 >0) and a and b are continuous boundary parameters (a < b) that appear as exponents of the random variable and control the shape of the distribution. It was used for the variables MKT, Q, DC, FOB, and FASw/o. The CDF $F(x;\alpha,\beta) = \frac{\mathrm{B}(x;\alpha,\beta)}{\mathrm{B}(\alpha,\beta)} = I_x(\alpha,\beta)$

[10-7 used is this paper is as follow:

$$F(x;\alpha,\beta) = \frac{\mathrm{B}(x;\alpha,\beta)}{\mathrm{B}(\alpha,\beta)} = I_x(\alpha,\beta)$$ [10-7]